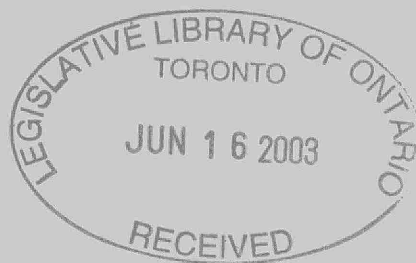


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**Littoral Substrate Data Summary
Associated with the Littoral Zone
Benthic Macroinvertebrate Survey in
Central Ontario**

June 2002



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Littoral Substrate Data Summary Associated with the Littoral Zone Benthic Macroinvertebrate Survey in Central Ontario

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EXECUTIVE SUMMARY

The Dorset Environmental Science Centre of the Ontario Ministry of the Environment (MOE) conducted a programme to assess the influence of substrate on the composition and abundance of benthic invertebrates in soft and hardwater lakes and wetlands in central Ontario. The programme consisted of a temporal and a spatial component. This report summarizes the substrate data associated with a spatial survey of 59 lakes from 1993 to 1996.

Substrate evaluations were completed at each of 5 sites on each lake. Sites had been previously chosen based on the predominant types of nearshore substrates for each lake following a protocol developed in a benthic invertebrate study which was initiated in 1988. The invertebrate study represents the central Ontario component of the federal-provincial Long Range Transport of Airborne Pollutants (LRTAP) programme that was designed to assess regional changes in the health of inland aquatic ecosystems associated with reductions in sulphur emissions (Shaw et al. 1992). Wetlands used in this study were part of a series of wetlands sampled by the Canadian Wildlife Service to assess the impacts of acidic deposition on wildlife (McNicol et al. 1996). Substrate assessments were divided into two main parts: quadrat floor with ten substrate components and water column with ten categories. From these substrate assessments a series of indices for both the quadrat floor and the water column were calculated. These results are summarized here, with an additional evaluation of field-enumeration bias. Patterns identified in this report will be contrasted with results from the benthic invertebrate assessment in subsequent reports.

TABLE OF CONTENTS

Executive Summary	I
Table of Contents	II
List of Tables	III
List of Figures	III
List of Appendices	III
Introduction	1
Study Location	3
Climate and Vegetation.....	3
Geology.	4
Methods.....	4
Lake selection.....	4
Site selecton	6
Substrate assessment protocol.....	6
Substrate data QA/QC assessment.....	6
Water chemistry.....	8
Results.....	8
Lake morphology and water chemistry	8
Littoral zone substrate.....	13
Quatrat floor.....	13
Water column components	13
Substrate data QA/QC assessment.....	15
Summary and Recommendations.....	17
References.	19

LIST OF TABLES

Table 1	Average monthly and annual air temperatures (°C) for the Dorset, ON area from 1993 to 1996.....	3
Table 2	Location and morphology of the study lakes.....	7
Table 3	Littoral-zone habitat parameters with approximate size ranges, acronyms and description and chemical parameters with units of measurement, abbreviations and description.....	9
Table 4	Littoral habitat data summary sheet.....	10
Table 5	Chemical parameters for the 59 study lakes.....	11
Table 6	Mean values (minimum – maximum) for 19 chemical parameters for the 6 sets of lakes.....	12
Table 7	Littoral habitat summary indices for the 59 lakes.....	14
Table 8	Substrate assessment QA/QC evaluation from Paint Lake.....	16

LIST OF FIGURES

Figure 1	Map illustrating bedrock geology, watersheds and forest regions of the study lakes.....	2
Figure 2	Map illustrating the location of the study lakes.....	5
Figure 3	Littoral habitat summary indices for the 59 lakes separated by geological regions.....	15
Figure 4	Substrate data analysis variance component plot of total variance explained and site variance.....	17

LIST OF APPENDICES

Appendix 1	Bedrock geology, watersheds and forest regions of the 59 lakes.....	A1-1
Appendix 2	Littoral habitat data summary sheets for the 59 lakes.....	A2-1
Appendix 3	Littoral habitat substrate summarized by site for the 59 lakes.....	A3-1
Appendix 4	Littoral habitat substrate summarized by lake for the 59 lakes.....	A4-1
Appendix 5	Littoral habitat summary indices for the 59 lakes.....	A5-1

INTRODUCTION

In 1988, the Ontario Ministry of the Environment initiated a biomonitoring programme to assess long-term trends in the composition of benthic invertebrate communities in small, softwater Precambrian Shield lakes. This study represents the central Ontario component of the federal-provincial Long Range Transport of Airborne Pollutants (LRTAP) programme that includes an assessment of anticipated regional changes in the health of inland aquatic ecosystems associated with reductions in sulphur emissions (Shaw et al. 1992). A standard set of survey protocols was used by members of the LRTAP programme to permit comparisons among data sets collected from 6 areas in eastern Canada (Reid et al. 1994). The goals of this LRTAP programme were (1) to estimate common species distributions; (2) to compare relative abundance among lakes and among regions; and (3) to detect the response of benthic invertebrates to anticipated changes in water chemistry associated with emission controls (Shaw et al. 1992; 1995). Additional studies in the hard and softwater lakes and wetlands in the south portion of central Ontario were initiated in conjunction with the Canadian Wildlife Service (McNicol et al. 1996).

Substrate, which is one part of the habitat of most aquatic animals, has been recognized for its importance to fish for a long time (Bowlby and Roff 1986; Meffe and Sheldon 1988; Simonson et al. 1994). In addition, many studies have

documented the influence of substrate on benthic organisms (Percival and Whitehead 1929; Moon 1939; Pennak and Van Gerpen 1947; Cummins and Lauff 1969; Rabeni and Minshall 1977; Culp et al. 1983; Resh et al. 1995). For example, Barton and Hynes (1978) determined that even very minimal changes in substrate can greatly affect the variability between benthic samples that would otherwise be identical. Recently, sediment characters have been included in predictive models of benthic animals and plants (Rasmussen and Rowan 1997).

Substrate characteristics can include measurements of sand grains to boulders, which can be evaluated according to a variety of scales (e.g. Cummins modified scale, Wentworth classification, Phi scale; Cummins 1962, Cummins and Lauff 1969). While some researchers feel substrate size has the most effect on the composition and/or abundance of benthic invertebrate communities (Williams 1978; Williams and Mundie 1980), others feel that substrate parameters such as the presence or absence of detritus may directly influence invertebrate distribution (Culp et al. 1983). Since most invertebrate species require some type of cover as protection from predators and/or as a food source, the importance of substrate including macrophytes, algae and detritus cannot be underestimated.

This report describes the substrate parameters that were measured for each of 5 sites in 59 lakes that were sampled over a 4 year period (1993-1996). All

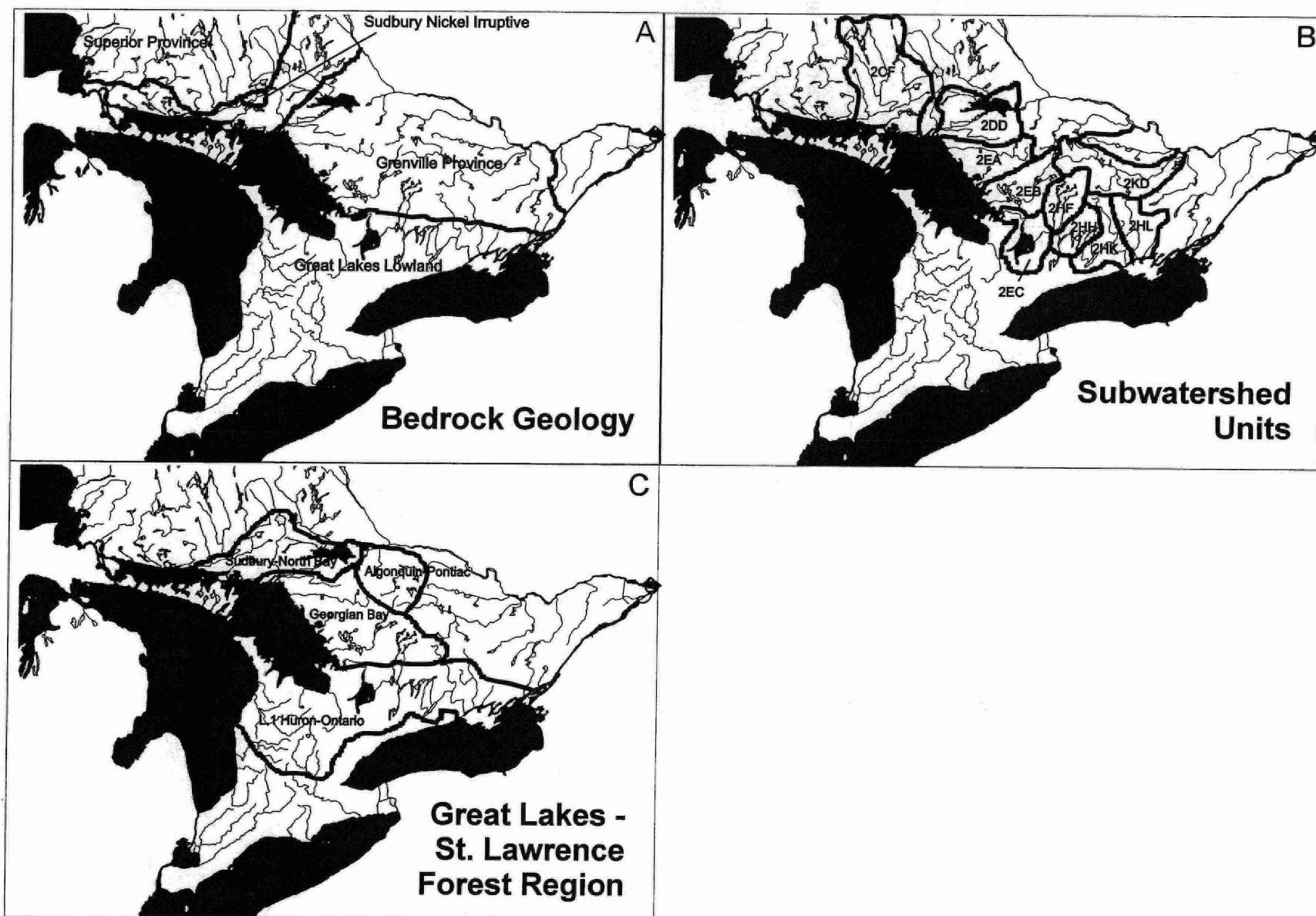


Figure 1. Map illustrating the bedrock geology, watersheds and forest regions of the study lakes.

Table 1. Average monthly and annual air temperatures (°C) for the Dorset, ON area from 1993 to 1996.

Year	Average Air Temperature (°C)												Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1993	-8.11	-13.15	-3.70	4.69	10.98	15.30	19.10	18.38	10.93	5.23	-0.47	-6.65	4.38
1994	-18.02	-12.39	-3.34	4.18	10.15	16.49	18.37	15.67	12.89	7.27	1.98	-4.38	4.07
1995	-6.15	-11.42	-0.86	1.51	11.07	18.12	18.75	18.61	10.95	8.34	-2.96	-9.83	4.68
1996	-11.29	-9.70	-4.86	1.89	9.94	16.81	16.92	17.62	13.79	6.68	-2.10	-3.18	4.38
Average	-10.89	-11.67	-3.19	3.07	10.54	16.68	18.28	17.57	12.14	6.88	-0.89	-6.01	4.38

substrate evaluations were made in the fall of the year between September and November.

In the future, this information will be used to estimate within-lake and among-lake variation in littoral habitat. We expect that lakes with relatively more within-lake habitat variation will exhibit greater variation in benthic invertebrate abundance. Ultimately, we believe that this habitat data will be important for inter-lake comparisons to ensure that species lists and abundance are only compared among sites with similar habitat composition.

STUDY LOCATION

The study area extends over nine tertiary watersheds and includes three bedrock geological settings in central Ontario (Fig. 1a, b). As a result, the aquatic characteristics involve both hard and softwater areas in the Great Lakes - St. Lawrence drainage system (Fig. 1a).

Climate and vegetation – The range in average annual precipitation is 90 - 110 cm in the Dorset area (30-year record) with a total of 240 - 300 cm of snow each year, generally between December 1 and April

10. Lakes in the Dorset area are generally ice-covered from the first week of December to mid-April. As shown in Table 1, between 1993 and 1996, Dorset had average air temperatures of -10.89 °C and 18.28 °C for January and July, respectively. Between 1979 and 1998, the mean observed summer maximum surface (0 - 2.0 m) temperature for nine intensively monitored Dorset lakes was 23.2 °C. The minimum observed surface temperature ranged from 20.6 °C at Crosson Lake in 1979 to 21.6 °C at Heney and Red Chalk East lakes in 1992. The maximum surface temperature ranged from 24.9 °C at Plastic Lake in 1995 to 27.3 °C at Dickie Lake in 1989.

The study area is situated in the Great Lakes - St. Lawrence Forest region (Fig. 1c), characterized by the eastern white (*Pinus strobus*) and red pines (*Pinus resinosa*), eastern hemlock (*Tsuga canadensis*), tamarack (*Larix laricina*) and yellow birch (*Betula alleghaniensis*). Four forest zones within the Great Lakes - St. Lawrence region are included in the study area and are described in greater detail in Appendix 1. The differences in these forest zones in part explain the distribution and abundance of forest litter in the water column and upon the quadrat floor.

Geology - Four lakes in the Sudbury region (Clearwater, Lohi, Hannah and Middle) are situated over the Southern Province (Sudbury Nickel Irruptive) bedrock geology of Middle Precambrian age. This watershed has been affected by several environmental factors over a period of almost a century: sulphur dioxide fumigation; metal deposition; intense logging; wild fires; water and wind erosion; and enhanced frost action (Winterhalder 1984). The landscape can be described as rock knobs or ridges of rolling undulating, sometimes rugged topography of moderate elevation relief. Low relief deposits of silt, silty clay and organic materials are scattered throughout the region.

The last period of mountain building of the Late Precambrian period was the Grenville orogeny which formed the Grenville Province, a roughly rectangular strip of land 400 km wide and 2000 km long stretching from Georgian Bay to Labrador. Forty-nine of the study lakes are situated in this province on the Precambrian (Canadian) Shield (Jefferies and Snyder 1983, Girard and Reid 1990a). The bedrock of the Canadian Shield is granitic in composition, usually composed of granitic gneisses and migmatites with marble, quartzite, amphibolite and various igneous intrusives of less importance (Jefferies and Snyder 1983). During the Pleistocene period four glacial advances, including the most recent or Wisconsin glaciation, have rounded and polished the rock outcrops of the Shield, lowering the relief, scouring many river and lake basins

and depositing glacial debris, including moraines, eskers, outwash sands, gravel and lake sediments. The surficial deposits and characteristics of the watersheds are a consequence of this glacial activity. Minor till plains and thin till deposits interrupted by rock ridges are the dominant surficial features (Jefferies and Snyder 1983, Girard et al. 1985, Reid and Snyder 1986; Girard and Reid 1990a).

Six study lakes are located in the Kawarthas region (Balsam, Buckhorn, Chemung, Duck, Scugog and Rush). The Kawartha lakes are located south of 44° 45' latitude and thus, are within the Great Lakes Lowland (one of three Phanerozoic Lowlands). These fossiliferous strata of the Phanerozoic Lowlands contain Ontario's youngest sedimentary bedrock (Cretaceous). Several glacial episodes have eroded this area and left debris of sand and gravel in the form of eskers, moraines and broad shallow flood plains (Springer 1978).

METHODS

Lake selection - A total of 59 lakes from south-central Ontario were sampled over a four year period from 1993 to 1996 (Fig. 2, Table 2). Eight of the lakes were small ponds, sampled in 1996 as part of an MOE programme to collect benthic invertebrates from wetlands. These wetlands were part of a series sampled by the Canadian Wildlife Service to assess the impacts of acidic deposition on wildlife (McNicol et al. 1996). These small lakes and wetlands are identified in Table 2 by an alpha-numeric code following each water body

name (e.g., Blue Chalk (P1-33) for plot 1, waterbody #33), as used in McNicol et al. (1996).

Four lakes sampled in 1993 are long-term temporal-trend lakes (Reid et al. 1997a). Twenty-seven lakes sampled in 1994 and 19 in 1995 were part of an MOE survey studying benthic invertebrates and crayfish (Reid et al. 1997a; David et al. 1996; David et al. 1997; David et al. 1998).

Site selection - Each study lake was circumnavigated and the relative frequencies of various substrate types between the shore and a depth of approximately 1 m was recorded. Five sites for each lake were then selected to include the predominant substrates.

Substrate assessment protocol - Prior to 1994, substrate data were recorded as percentages for the MOE temporal set of fourteen lakes, however this classification was for the quadrat floor only and for fewer parameters (Reid et al. 1997b). Data were recorded in conjunction with the collection of benthic organisms, including crayfish.

To quantify the frequency of various substrate types at each site in a study lake or wetland, a circular quadrat, one metre in diameter, was used. At each site, one member of the field crew randomly tossed the quadrat into five areas (replicates) within the site region. Distances between quadrats were at least one metre apart, when possible. Substrate evaluation sheets were completed at each of the five sites in accordance to the approximate

size ranges and substrate descriptions presented in Table 3. For each site, five replicate substrate areas were described.

The substrate was divided into two categories: the quadrat floor with ten substrate descriptors and the water column with ten descriptors. For these two layers, an estimate of the proportions of each type of habitat (Table 4) was recorded in increments of 5%. The 10 habitat types for the quadrat floor represent a traditional particle-size spectrum with the addition of macrophytes, woody debris and an "other" category. At most sites, it was necessary to use a paddle to dig down into the substrate to accurately determine the percentages of silt, sand and other substrate components.

Despite the potential for rounding error, the total for the quadrat floor should sum to 100%. However, totals for the water column could range from 0% to 200%, or more. This is due to the possible three dimensional layered effect of more than one parameter in the water column (e.g. macrophyte growth combined with the presence of algae and/or periphyton, as well as a layer of detritus). Substrate assessment is subjective and therefore the same member of the field crew described the substrate for all lakes and wetlands.

Substrate data QA/QC assessment - To evaluate substrate assessment variability among different field crews, 5 sites were assessed by 3 different individuals. All 5 sites were in Paint Lake, near the Dorset

Table 2. Location and morphology of the study lakes.

LAKE (code) ¹	SAMPLE DATE	LATITUDE	LONGITUDE	SUB-WATERSHED	ELEVATION (m)	AREA (ha)	VOLUME m ³ x 10 ⁵	MAX DEPTH (m)	MEAN DEPTH (m)
<u>SUDBURY</u>									
CLEARWATER	05-Oct-94	46°22'	81°03'	2CF5	285	76.5	64.2	21.5	8.4
HANNAH	04-Oct-94	46°21'	81°02'	2CF8	283	27.3	10.8	8.5	4
LOHI	05-Oct-94	46°23'	81°02'	2CF5	282	40.5	25	19.5	6.2
MIDDLE	04-Oct-94	46°26'	81°02'	2CF8	282	28.2	17.5	15	6.2
<u>CANADIAN SHIELD</u>									
SMALL									
CHUB	02-Nov-94	45°13'	78°59'	2EB9	371	32.2	28.5	27	8.9
CLAYTON	18-Oct-94	45°21'	78°45'	2EB12	427	10.1	2.8	8.2	3.5
CRADLE	26-Oct-93	45°28'	78°35'	2KD18	472	17.9	22.3	33.3	12.4
DELANO	26-Oct-93	45°31'	78°36'	2KD1	442	17	17	18.6	7.1
GLEN	16-Nov-95	45°08'	78°30'	2HF10	358	16.3	11.8	15	7.2
HAMER	30-Oct-95	45°14'	79°48'	2EB5	236	35.2	11.6	8.5	3.3
HENEY	31-Oct-94	45°08'	79°06'	2EB9	345.5	21.4	7.1	5.8	3.3
MOUSE (MOOSE) (P2-6)	26-Oct-94	45°15'	78°51'	2EC15	351.5	9	4.4	9	4.9
PLASTIC (P2-8)	02-Nov-94	45°11'	78°50'	2HF10	379	32.1	25.2	16.3	7.9
RANGER	26-Oct-94	45°09'	78°15'	2HF10	340	11.3	6.3	13	5.6
RED CHALK EAST	07-Nov-94	45°11'	78°56'	2EC15	343	13	7.5	19	5.7
SKIDWAY	03-Nov-93	45°12'	79°52'	2EB2	221	18.5	5.4	7.8	2.9
MEDIUM									
BASSHAUNT	25-Oct-94	45°07'	78°28'	2HF10	403.9	47.3	36.6	24	7.7
BEAR	01-Nov-95	45°20'	78°42'	2EB12	355.1	94.7	35.5	36.6	9.4
BLUE CHALK (P1-33)	07-Nov-94	45°12'	78°56'	2EC15	351	52.4	44.7	23	8.5
BUCK	08-Nov-95	45°23'	79°00'	2EB10	376	40.3	43.9	30	10.9
CLEAR	18-Oct-95	45°11'	78°43'	2HF8	368	88.4	109.1	33	12.4
CROSSON	20-Oct-94	45°05'	79°02'	2EC15	332	56.7	52.2	25	9.2
DICKIE	23-Oct-95	45°09'	79°05'	2EB9	355	93.2	46.4	12	5
FAWN	03-Nov-94	45°10'	79°15'	2EB13	297	85.8	30.2	7.9	3.5
HARP	11-Oct-94	45°23'	79°08'	2EB13	327	71.4	95.1	37.5	13.3
MEACH	23-Oct-95	45°18'	78°08'	2KD15	442	42	20.1	12	4.8
MOOT	03-Oct-94	45°09'	79°10'	2EB9	335.5	46.2	12.4	7.9	2.7
PEARCELEY	10-Oct-95	45°42'	79°30'	2EA20	358.1	44.1	20.8	8.1	4.7
PINCHER (P6-38)	27-Oct-93	45°34'	78°51'	2EB13	510	42.1	25.5	15.5	6.1
RED CHALK MAIN (P1-26)	07-Nov-94	45°11'	78°56'	2EC15	343	43.9	73.3	38	16.7
RIDOUT (P1-18)	19-Oct-94	45°07'	78°59'	2EC15	352	46.8	308	20.4	6.6
WESTWARD	19-Oct-95	45°29'	78°45'	2EB11	428.5	63.3	129	44.4	20.5
LARGE									
BIGWIND	20-Oct-94	45°03'	79°03'	2EB9	319	111	118	32	10.7
BOSHKUNG	24-Oct-95	45°04'	78°44'	2HF10	307.5	716	1654	71	23.1
BRANDY	25-Oct-95	45°06'	79°31'	2EB4	227	108	37.7	7.5	3.5
CROWN	26-Oct-95	45°26'	78°40'	2EB11	480	136	108.4	30	8
DICKEY	17-Oct-94	44°47'	77°44'	2HK10	314	214	392	54	18.3
HALLS	24-Oct-95	45°06'	78°45'	2HF8	326	543.2	1526	80.5	28.1
KAWAGAM	01-Nov-95	45°18'	78°45'	2EB12	355.1	2818.8	6144	73.2	21.8
KOSHLONG	25-Oct-94	44°58'	78°29'	2HF6	346	401.2	41.5	42.7	10.4
LEONARD	25-Oct-95	45°04'	79°27'	2EB4	264.5	195	134	15.2	6.9
LOUISA	24-Oct-94	45°28'	78°29'	2KD19	441	531	885.9	61	16.1
SHERBORNE	17-Oct-95	45°11'	78°47'	2HF8	357	252	241	35.1	9.6
SMOKE	22-Nov-95	45°31'	78°41'	2EB11	422	679	1100	55	16.2
TIMBERWOLF	03-Oct-94	45°41'	78°48'	2KD13	427	167	124	20.4	7.4
TWELVE MILE	28-Oct-94	45°01'	78°43'	2HF8	307.5	337	40.7	27.4	12
YOUNG	30-Oct-95	45°13'	79°33'	2EB7	251.5	106	127.4	21.1	12
<u>KAWARTHAS</u>									
BALSAM	13-Oct-94	44°35'	78°50'	2HF2	256	4665	23325	14.9	5
BUCKHORN	06-Nov-95	44°29'	78°23'	2HH2	75	3191	7420	9.4	2.3
CHEMUNG	06-Nov-95	44°24'	78°23'	2HH2	75	2280	5526	6.7	2.4
SCUGOG	12-Oct-94	44°10'	78°50'	2HG4	250	6374	11473	7	1.8

Table 2, continued. Location and morphology of the study lakes.

LAKE (code) ¹	SAMPLE DATE	LATITUDE	LONGITUDE	SUB-WATERSHED	ELEVATION (m)	AREA (ha)	Zmax (m)
WETLANDS							
AVERY (P2-18)	23-Sep-96	45°12'	78°49'	2HF8	399.5	7.5	12
DAWSON POND(P2-5)	18-Sep-96	45°10'	78°50'	2HF10	376	0.5	3.8
DUCK	30-Sep-96	44°40'	78°58'	2EC13	273	44.4	3.5
PLOT 2 POND 9	23-Sep-96	45°11'	78°49'	2HF10	384	0.3	0.5
PLOT 2 POND 19	19-Sep-96	45°12'	78°48'	2HF8	403	3.8	7.1
RED CHALK POND 1	02-Oct-96	45°12'	78°56'	2EC15	344	1	4.2
RUSH	30-Sep-96	44°43'	78°56'	2EC13	268	34.4	3
SLIM (P4-24)	26-Sep-96	45°28'	78°54'	2EB15	444	8.9	8.7

¹ from McNicol et al. 1996

Environmental Science Centre. Separate substrate evaluation sheets were completed by each person and the resultant data were summarized and compared using variance components (e.g., see Reid et al. 1995).

Water chemistry - In most lakes and wetlands, water samples were collected on the same day that substrate was documented. However, the water chemistry of several lakes is regularly monitored throughout the ice-free season. In these cases, water chemistry sampled on the date most similar to the substrate sampling data was tabulated.

Mid-lake water samples were collected as 0-5 m tube composites (Girard and Reid 1990b); alternatively 3 L of water were collected with a peristaltic pump (Masterflex Portable Sampling Pump, Model 7570) using 3/8 inch i.d. tubing (Tygon R3603). Depth composites were obtained by pumping water into an 8 L polyethylene carboy while the end of the tube was lowered to the desired depth and brought back to the surface. When a

pump was used, the tube was lowered and raised through the water column at a constant rate to sample each depth equally. In order to remove fine particulates, the resultant water was filtered through 80 µm mesh polyester screen placed at the mouth of the carboy. Subsamples from the carboy were then poured into the appropriate bottles and containers for subsequent analysis at the laboratory. The chemical parameters included: alkalinity (Alkti), aluminum (Al), calcium (Ca), chloride (Cl), conductivity (Cond25), dissolved inorganic carbon (DIC), dissolved organic carbon (DOC), iron (Fe), potassium (K), magnesium (Mg), sodium (Na), nitrogen (NH₄, NO₂, NO₃, and TKN), pH, sulphate (SO₄) and total phosphorus (TP) (Table 3). All chemical analyses were completed within 24 hours of sample collection using standard analytical procedures (Girard and Reid 1990b).

RESULTS AND DISCUSSION

Lake morphology and water chemistry-
The 59 lakes ranged in area from 0.3 to

Table 3. Littoral-zone habitat parameters with approximate size ranges, acronyms and description and chemical parameters with units of measurement, abbreviations and description.

Layer	Parameter	Particle	(phi)	Acrony	Description
<u>Quadrat Floor</u>					
1	Clay	<0.0039	9	CLA	sheets or clumps of clay
2	Silt	0.0039 -	5 to 8	SLT	silt
3	Sand	0.0625 - 2	0 to 4	SND	fine to coarse sand
4	Gravel	2 - 64	-1 to -5	GRA	gravel to large pebbles
5	Cobble	64 - 256	-6 to -7	COB	small rocks
6	Boulder	> 256	-8	BOU	large rocks
7	Bedrock	-	-	BDR	sheets of rock
8	Macrophytes	-	-	MAC	rooted plants
9	Woody Debris	-	-	LOG	logs, branches and roots
10	Others (e.g.	-	-	MSC	miscellaneous (specify)
<u>Water Column</u>					
11	Periphyton	-	-	PYT	attached algal layer
12	Filamentous	-	-	ALG	'clouds' of algae
13	Macrophytes	-	-	MAC	submergent / emergent plants
14	Leaves	-	-	LVS	deciduous leaves
15	Pine Needles	-	-	PNS	coniferous needles
16	Woody Debris	-	-	LOG	logs, branches and roots
17	Detritus	-	-	DET	decomposed plant matter
18	Cobble	64 - 256	-6 to -7	COB	small rocks
19	Boulder	> 256	-8	BOU	large rocks
20	Other	-	-	MSC	miscellaneous (specify)

Parameter	Abbreviations		Description
Alkalinity (mg.L ⁻¹)	ALKTI	ALKTI	Total inflection point alkalinity
Aluminum (mg.L ⁻¹)	AL	ALUT	Total aluminum, unfiltered
Calcium (mg.L ⁻¹)	CA	CAUR	Calcium unfiltered, reactive
Chloride (mg.L ⁻¹)	CL	CLIDUR	Chloride unfiltered, reactive
Conductivity (µmho.cm ⁻¹)	COND25	COND25	(µmho.cm ⁻¹) at 25°C
Dissolved Inorganic Carbon (mg.L ⁻¹)	DIC	DIC	Dissolved inorganic carbon
Dissolved Organic Carbon (mg.L ⁻¹)	DOC	DOC	Dissolved organic carbon
Iron (µg.L ⁻¹)	FE	FEUT	Total iron
Potassium (mg.L ⁻¹)	K	KKUR	Total potassium
Magnesium (mg.L ⁻¹)	MG	MGUR	Magnesium
Manganese (µg.L ⁻¹)	MN	MNUR	Manganese
Silica (mg.L ⁻¹)	SiO ₃	SIO3UR	Silica
Sodium (mg.L ⁻¹)	NA	NAUR	Sodium
Ammonium (µg.L ⁻¹)	NH ₄	NNHTFR	Ammonium
Nitrate-nitrite (µg.L ⁻¹)	NO ₂ , NO ₃	NNOTFR	Nitrate-nitrite
Total Kjeldahl Nitrogen (µg.L ⁻¹)	TKN	NNTKUR	Total Kjeldahl nitrogen
PH	PH	PH	[H ⁺] negative log scale
Sulphate (mg.L ⁻¹)	SO ₄	SSO4UR	Sulphate as SO ₄
Total Phosphorus (µg.L ⁻¹)	TP	PPUT	Total phosphorus as P

Table 4. Littoral Habitat data summary sheet.

Lake name: Clear
Sampling Date: 951018

Sampled by: RAR RG

QUADRAT FLOOR												WATER COLUMN											
Site	Replicate	CLA	SLT	SND	GRA	COB	BOU	BDR	MAC	LOG	MSC	PYT	ALG	MAC	LVS	PNS	LOG	DET	COB	BOU			
MSC																							
1	1		10	50	30	10						10		10				10	20				
1	2			30	20	40			10				10	10				10	20				
1	3		15	40	30	10			5			10		10				10	10				
1	4		25	10	30	30			5			10		10				5	30				
1	5		10	20	30	30			10			10	10	10				10	10				
2	1		20	60		10				10					20	20	20	10					
2	2		10	40		30	10			10					10	10	15	10	10				
2	3			80		10				10					5	5	10	10					
2	4			60		30				10					20	10	20	15					
2	5		10	50		20	10			10					10	10	20	10	10	20			
3	1			70					20	10		10		30		20	10	10					
3	2		60	20					10	10		10		10			20	30					
3	3		30	40			20			10		10		10	20	10	10		10				
3	4		50	30					10	10				20	20	5		20					
3	5		25	30	30	10			5					10		5		20	10				
4	1			60					20	20		15		30	10	5	10	10					
4	2			40	20				20	20				20	10		20	20					
4	3			50	20				20	10		20		20	5	10	20						
4	4		20	40	20				20			10		20	10		20	20					
4	5		20	40	10				20	10		10		40	10		10	20					
5	1		80						10	10		10	10	20	20	10	10	30					
5	2		70			10			10	10		10		20	10	10	30	30					
5	3		70						10	20		10	10	10	20	20	20	30					
5	4		60						30	10		10	10	30	5		10	30					
5	5		70			10			10	10				20	10	5	10	30					

6374 ha for Plot 2 Pond 9 and Scugog Lake, respectively (Table 2). The area of the lakes located in the Sudbury region ranged from Hannah Lake (27.3 ha) to Clearwater Lake (76.5 ha). The Shield lakes had an area range of 0.3 (Plot 2 Pond 9) to 2818.8 ha (Kawagama Lake). Due to the large number of lakes sampled on the Shield, lakes were further divided by size into three groups: small (less than 40 ha), medium (greater than 40 and less than 100 ha) and large (greater than 100 ha). The Kawartha lakes had areas

ranging from 2280 (Chemung Lake) to 6374 ha (Scugog Lake).

Like area, maximum depth of the lakes was diverse. Overall, the maximum depth ranged from 0.5 (Plot 2 Pond 9) to 80.5 m (Halls Lake) (Table 2). Both of these lakes are located in the Shield area of the study. For the Sudbury lakes, the depth ranged from 8.5 to 21.5 m for Hannah and Clearwater lakes, respectively. The Kawartha lakes had a maximum depth range of Scugog (7 m) to Balsam (14.9 m).

Table 5. Chemical parameters for the 59 study lakes (see Table 3 for units of measurement).

LAKE	pH	ALK	TP	NH3	NO3	AL	MN	FE	CA	MG	K	NA	CL	SO4	DIC	DOC	Cond25	SI	TKN
SUDBURY																			
CLEARWATER	5.37	-0.11	3.1	23	8	41	161	36	5.3	1.2	0.56	3.18	8.69	15.1	0.38	2	64.6	0.52	180
HANNAH	7.23	13.5	5.2	16	3	2	11	28	11	4	1.54	44.8	77.9	32	3.12	3.7	332	0.46	300
LOHI	5.91	0.79	4.5	25	3	14	125	120	5.4	1.5	0.83	3.83	9.34	15.1	0.56	2.3	68.6	0.56	200
MIDDLE	6.87	7.4	5	30	7	2	49	52	8.23	3	1.12	29.2	54.7	27.2	1.88	3.5	245	1.06	280
CANADIAN SHIELD																			
SMALL																			
CHUB	5.93	1.4	6.8	21	19	93	29	87	2.2	0.7	0.33	0.73	0.34	5.65	0.56	5.9	22.9	1.26	280
CLAYTON	5.7	0.3	6.5	23	6	31	54	52	1.9	0.4	0.32	0.56	0.29	6.15	0.41	2.9	20.2	0.26	240
CRADLE	5.67	0.3	12	7	44	23	3	4	1.7	0.5	0.3	0.45	0.34	6.2	0.72	1.9	22.2	0.11	160
DELANO	6	1.9	9.6	9	75	88	59	242	2.6	0.8	0.36	0.73	0.32	6.9	1.03	6.8	28.1	1.8	300
GLEN	7.75	59.6	12.6	81	54	7	57	13	21.8	6.6	1.5	0.89	0.67	25.6	9.77	3.4	172	1.84	380
HAMER	5.63	1.7	16.5	41	42	182	24	447	2.2	0.5	0.51	1.22	2.13	3.2	0.53	10.3	26.4	0.56	460
HENEY	6.1	1.3	8	55	43	48	16	87	1.4	0.4	0.42	0.88	0.88	4.35	0.54	3.5	20.4	0.32	220
MOUSE	5.84	1.2	5.5	31	9	73	54	239	2.29	0.66	0.27	0.64	0.37	6.3	0.87	4.2	24.5	0.66	260
PLASTIC	5.76	0.4	5.9	22	12	31	44	80	1.59	0.4	0.21	0.49	0.35	5.8	0.7	2.1	27.1	0.8	140
RANGER	6.06	1.8	5.2	26	9	62	39	267	2.3	0.69	0.38	0.79	0.55	5.6	0.92	5.6	25	0.66	280
RED CHALK EAST	6.32	3.5	6.5	46	90	48	38	159	2.62	0.92	0.35	0.82	0.35	6.5	1.23	3	27.2	1.02	200
SKIDWAY	5.3	-0.1	17.5	75	83	118	4	234	1.69	0.51	0.38	0.69	0.45	6.7	0.47	4.1	22.7	0.36	410
MEDIUM																			
BASSHAUNT	6.61	6.8	4.8	28	92	23	14	58	4.2	1.1	0.49	0.66	0.51	6.4	1.98	4.3	36.6	0.92	320
BEAR	6.35	2.8	10	14	98	15	13	51	2.3	0.7	0.42	0.78	0.35	6.15	0.92	3.4	25.2	1.54	220
BLUE CHALK	6.61	4.5	5.1	35	24	2	33	56	2.4	0.7	0.38	0.78	0.39	5.7	1.17	1.9	26.9	0.04	180
BUCK	6.53	4.5	7.6	24	66	8	25	32	2.4	0.7	0.48	0.72	0.35	5.5	1.63	2	64.6	0.9	260
CLEAR	5.97	0.7	1.7	3	2	12	14	1	2	0.5	0.36	0.49	0.38	7.05	0.15	1.4	24	0.04	140
CROSSON	5.87	0.9	11.7	11	29	102	35	313	1.8	0.6	0.37	0.66	0.35	5.6	0.73	5	22.6	0.6	280
DICKIE	6.14	1.8	15.7	42	14	55	51	192	2.6	0.6	0.41	1.95	3.28	5	0.67	6	32.9	0.16	320
FAWN	5.79	1.8	22	26	55	123	60	560	2.7	0.7	0.49	1.35	1.52	5.47	0.9	9.1	31.8	1.2	453
HARP	6.3	4	7.1	40	129	52	25	73	3.4	0.8	0.54	1.99	2.62	6.15	1.02	4.6	37.9	1.04	220
MEACH	6.66	6.7	8.2	55	10	30	53	127	3.33	0.9	0.81	1.27	0.37	7.1	1.84	4.8	34.2	1.66	340
MOOT	5.65	1.5	15.5	29	39	113	40	750	2.09	0.5	0.29	0.56	0.39	5.3	0.73	6.95	22.5	0.8	529
PEARCELEY	5.3	-0.1	4.4	17	40	64	67	59	1.59	0.27	0.3	0.45	0.3	5.8	0.27	1.69	18.5	0.29	163
PINCHER	5.55	0.3	9.2	45	24	78	54	162	1.45	0.41	0.39	0.85	0.23	5.3	0.49	3.9	18.5	0.96	280
RED CHALK MAIN	6.18	3.2	3.8	10	101	36	71	116	2.48	0.78	0.37	0.72	0.37	6.7	1.01	2.9	26.9	1.06	200
RIDOUT	6.4	2.5	7.6	11	5	8	23	32	2.36	0.73	0.4	0.71	0.36	6	0.86	3.8	24.8	0.08	240
WESTWARD	6.53	2.4	4.5	24	2	7	1	5	2.91	0.92	0.65	1.88	0.26	5.2	0.64	1.8	21.9	0.08	160
LARGE																			
BIGWIND	6.51	3	5.2	49	7	2	18	26	2.5	0.7	0.38	0.76	0.44	5.95	0.98	3.3	28.4	0.94	200
BOSHKUNG	7.06	10.5	4	27	31	14	3	8	4.8	1.3	0.69	1.73	0.41	6.4	2.68	3.2	47.6	0.92	200
BRANDY	6.58	8.4	25	35	55	144	80	550	4.5	1.4	0.76	4.98	7	5.74	2.06	11.8	61.8	1.75	639
CROWN	6.16	1.7	3.9	19	13	2	19	26	1.8	0.5	0.37	0.54	0.29	5.6	0.64	2.2	2.2	0.28	180
DICKEY	7.84	61.6	8.6	25	17	23	5	8	18.4	2	1.3	0.84	1.5	6.15	13.3	5.7	142	1.22	360
HALLS	6.66	3.3	4.1	23	25	13	1	3	2.7	0.7	0.52	1.15	1.23	6.8	0.88	2.8	29.4	0.66	180
KAWAGAMA	6.49	2.8	11.7	16	129	2	3	12	2.3	0.7	0.41	0.77	0.41	6.4	0.92	2.6	26.4	1.22	200
KOSHLONG	6.57	3.2	4.3	9	20	2	25	15	3	0.7	0.37	1.36	1.65	6	0.93	4.2	31.2	0.26	260
LEONARD	6.25	2	2.1	33	12	35	39	126	2.2	0.5	0.4	2.61	3.71	5.45	0.64	4	32.8	0.32	240
LOUISA	6.36	1.9	3.9	20	37	2	8	9	1.86	0.65	0.39	0.73	0.34	6.7	0.64	3.3	25.8	0.88	180
SHERBORNE	6.46	1.9	3.2	5	3	15	15	7	1.93	0.55	0.36	0.63	0.38	6	0.56	2.9	22.6	0.64	222
SMOKE	6.36	2.5	5.5	8	116	27	27	56	2.74	0.81	0.41	1.21	1.19	7.8	1.1	2.9	38.2	0.96	189
TIMBERWOLF	5.99	1.5	6.5	10	9	31	28	64	2.36	0.66	0.4	0.7	0.23	6.1	0.66	4.7	23.6	0.7	260
TWELVE MILE	7.19	11	2	11	26	2	8	7	5.74	1.54	0.7	2.01	2.47	6.8	2.82	2.9	53.3	1.14	260
YOUNG	6.69	5	7.2	13	65	18	35	31	2.78	0.74	0.54	0.92	0.39	6.2	1.13	3.3	28.3	0.12	220
KAWARTHAS																			
BALSAM	7.76	40.9	13	17	3	2	10	22	17.4	2.4	0.77	2.79	4.11	7.9	9.65	3.7	121	1.36	260
BUCKHORN	7.97	73.3	19	36	12	8	4	16	20.1	2.4	0.95	4.43	8.32	9.9	15.7	5.7	196	0.38	420
CHEMUNG	8.15	87.4	15	35	11	4	8	8	22.3	2.5	1.13	5.86	13.6	10.3	18.7	6	242	1.5	560
DUCK	8.12	120	6.8	18	4	10	7	10	41.7	4.76	0.48	1.12	1.76	3.6	30	5.8	245	2.18	400
RUSH	7.97	131	9	74	16	16	7	10	No data	4.66	0.42	2.07	2.53	5.1	33.4	7	271	2.16	500
SCUGOG	8.31	101.4	37.2	59	3	16	44	15	39.9	8.75	2.53	11.2	18.6	12.4	23.4	11.7	286	2.6	1000
WETLANDS																			
AVERY	5.91	2.4	7.2	18	2	32	52	68	2.22	0.5	0.26	0.5	0.27	7.4	0.46	2.8	24	0.02	260
DAWSON POND	5.34	3.1	13.2	73	8	224	41	1060	1.34	0.32	0.23	0.47	0.3	2.8	4.1	8.4	15.6	1.08	540
PLOT 2 POND 19	5.87	2.6	8.4	13	2	48	20	36	1.58	0.46	0.25	0.48	0.24	5.3	0.58	4	18.4	0.38	300
PLOT 2 POND 9	4.93	1.6	32.6	26	6	140	26	292	0.64	0.22	0.14	0.25	0.09	1.3	1.92	10.2	10.4	0.42	760
RED CHALK POND 1	5.72	3.8	15.2	20	4	168	31	276	2.18	0.61	0.37	0.5	0.26	5.2	1.78	7.8	22.4	1.98	360
SLIM	6.31	4.2	7.6	25	8	72	14	184	1.68	0.54	0.3	0.61	0.25	4.4	0.9	3.5	18.8	0.38	320

Table 6. Mean values (minimum - maximum) for 19 chemical parameters for the 6 sets of lakes (see Table 3 for units of measurement).

PARAMETER	CANADIAN SHIELD					
	SUDBURY (4 lakes)	SMALL (12 lakes)	MEDIUM (16 lakes)	LARGE (15 lakes)	KAWARTHAS (6 lakes)	WETLANDS (6 lakes)
pH	5.85 (5.37 - 7.23)	5.80 (5.30 - 7.75)	5.95 (5.30 - 6.66)	6.46 (5.99 - 7.84)	8.01 (7.76 - 8.31)	5.45 (4.93 - 6.31)
ALK	5.39 (-0.11 - 13.50)	6.1 (-0.1 - 59.6)	2.8 (-0.1 - 6.8)	8.0 (1.7 - 61.6)	92.3 (40.9 - 1131.0)	3.0 (1.6 - 4.2)
TP	4.5 (3.1 - 5.2)	9.4 (5.2 - 117.5)	8.7 (1.7 - 22.0)	6.5 (2.0 - 11.7)	16.6 (6.8 - 37.2)	14.0 (7.2 - 32.6)
NH3	24 (16 - 30)	36 (7 - 75)	26 (3 - 55)	20 (5 - 49)	40 (17 - 74)	29 (13 - 73)
NO3	5 (3 - 8)	41 (6 - 90)	56 (2 - 129)	38 (3 - 129)	8 (3 - 16)	5 (2 - 8)
AL	14 (2 - 41)	67 (7 - 182)	45 (2 - 123)	22 (2 - 144)	9 (2 - 16)	114.0 (32 - 224)
MN	87 (11 - 161)	35 (3 - 59)	36 (1 - 67)	21 (1 - 80)	13 (4 - 44)	31 (14 - 52)
FE	59 (28 - 120)	159 (4 - 447)	162 (1 - 750)	63 (3 - 550)	13 (8 - 22)	319 (36 - 1060)
CA	7.48 (5.30 - 11.00)	3.69 (1.40 - 21.80)	2.50 (2.00 - 4.20)	3.97 (1.80 - 18.40)	28.28 (17.40 - 41.70)	1.16 (0.64 - 2.22)
MG	2.42 (1.20 - 3.00)	1.09 (0.40 - 0.92)	0.68 (0.27 - 1.10)	0.90 (0.70 - 1.54)	4.25 (2.40 - 8.75)	0.44 (0.22 - 0.61)
K	1.01 (0.56 - 1.54)	0.44 (0.21 - 1.50)	0.45 (0.29 - 0.81)	0.53 (0.36 - 1.30)	1.05 (0.42 - 2.53)	0.26 (0.14 - 0.37)
NA	20.25 (3.18 - 44.80)	0.74 (0.45 - 1.22)	0.99 (0.45 - 1.99)	1.40 (0.54 - 4.98)	4.58 (1.12 - 11.20)	0.47 (0.25 - 0.61)
CL	37.66 (8.69 - 77.90)	0.59 (0.29 - 2.13)	0.75 (0.23 - 3.28)	1.44 (0.23 - 3.71)	8.15 (1.76 - 18.60)	0.24 (0.09 - 0.30)
SO4	22.35 (15.10 - 32.00)	7.41 (3.20 - 25.60)	5.90 (5.00 - 7.10)	6.27 (5.45 - 7.80)	8.20 (3.60 - 12.40)	4.40 (1.30 - 7.40)
DIC	1.49 (0.38 - 3.12)	1.48 (0.41 - 9.77)	0.94 (0.27 - 1.98)	2.00 (0.56 - 13.30)	21.81 (9.65 - 33.40)	1.62 (0.46 - 4.10)
DOC	2.88 (2.00 - 3.70)	4.48 (1.90 - 10.3)	3.97 (1.40 - 9.10)	3.99 (2.20 - 11.80)	6.65 (3.70 - 11.70)	6.12 (2.80 - 10.20)
Cond25	177.6 (64.6 - 332.0)	36.6 (20.2 - 172.0)	29.4 (18.5 - 64.6)	39.6 (2.2 - 142.0)	226.8 (121.0 - 286.0)	18.7 (10.4 - 24.0)
SI	0.65 (0.46 - 1.06)	0.80 (0.11 - 1.84)	0.71 (0.04 - 1.66)	0.80 (0.26 - 1.75)	1.70 (0.38 - 2.60)	0.71 (0.02 - 1.98)
TKN	240 (180 - 300)	278 (140 - 460)	269 (140 - 529)	253 (180 - 639)	523 (260 - 1000)	423 (260 - 760)

The water chemistry varies over the study area because of three major factors: the geological nature of the lake catchments; the interaction of hydrology, spring and fall turnover, and wind and wave action on small versus large surface areas; and historical anthropogenic effects. The water chemistry of the 59 lakes reflect the net affect of these three factors.

A geological influence on water chemistry was observed when the lakes were divided into their respective geological areas (Table 5). The wetlands that are located in the Shield region were also separated to allow for comparison between lakes and wetlands. The mean pH values of lakes in Sudbury, the Canadian Shield, the Kawarthas and wetlands were 5.85, 5.93, 8.01 and 5.45, respectively (Table 6). The lakes on the Shield were further divided

into 3 sizes with mean pH values of 5.80 (small), 5.95 (medium) and 6.46 (large). Three of the four Sudbury lakes had been experimentally manipulated and therefore may not be representative of the true range in pH values in the region. These three lakes, Lohi, Hannah and Middle, had pH values of 5.91, 7.23, and 6.87, respectively.

The alkalinity range illustrated similar geological effects with a low of -0.1 mgL^{-1} in Pearceley Lake (Canadian Shield) to a high of 131.0 mgL^{-1} in Rush Lake (Kawarthas, wetland). The wide range in mean total phosphorus for the different regions reflects the difference in the nutrient poor Shield versus the eutrophic areas off the Shield. On the Shield, lakes showed a trend of decreasing total phosphorus as lake size increases (Table

6). This trend was also observed for mean ammonium concentrations. Both mean sodium and chloride concentrations increased as lake size in the Shield increased.

Littoral zone substrate - The nearshore substrate survey focused on the predominate littoral substrates in each lake (Appendix 2, 3 and 4). From the resultant substrate assessments, a series of indices for both the quadrat floor and the water column were created by combining parameters of similar origin and function (Table 7, Fig. 3, Appendix 5). The quadrat floor was divided into eight metrics: Silt+Sand, Gravel, Cobble+Boulder, Bedrock+Clay, Macrophytes, Log, Macrophyte+Log and Miscellaneous. The water column was separated into four metrics: Detritus+Pine Needles+Leaves, Log, Cobble+Boulder and Macrophytes+Periphyton+Algae.

Quadrat floor - The quadrat floor data from the 4 Sudbury lakes are dominated by Silt+Sand (46.3%), while Cobble+Boulder (21.3%), Bedrock+Clay (11.2%), and Gravel (12.8%) made up the remaining portions. Logs (1.2%) were infrequent, perhaps because of forestry, mining and subsequent defoliation in the first half of the last century. Similarly, the low Macrophyte numbers (7.1%) in these lakes may be due to low nutrients and the impact of acidification. The observed proportions of gravel, cobble, boulder, bedrock and clay may be elevated because of the low log and macrophyte components in the Sudbury lakes.

The study lakes on the Canadian Shield (43 lakes) and the Kawarthas (4 lakes) were dominated by Silt+Sand at 58.3% and 57.4%, respectively. The second most abundant habitats for the Shield and Kawarthas were Cobble+Boulder at 14.0% and 18.8% and Macrophytes at 10.1% and 7.1%, respectively. As a result, more similar littoral habitats exist in the lakes of the Canadian Shield and the Kawarthas than that found in the Sudbury lakes (Fig. 3).

The lakes on the Shield had substrates composed of Logs (5.9%), Gravel (6.4%), and Bedrock+Clay (4.0%). The remaining littoral substrates found in lakes in the Kawarthas were Logs (2.4%), Gravel (9.4%), and Bedrock+Clay (2.8%).

The 8 lakes in the wetlands set (located in both the Shield and the Kawarthas) were dominated by Silt+Sand at 46.8%. Unlike the other 3 groups of lakes, the next most abundant substrate was Macrophytes (28.4%), followed by Log (10.1%). Bedrock+Clay, Cobble+Boulder and Gravel made up the remaining habitats, with values of 8.0%, 3.9% and 2.8%, respectively.

Water column components - The proportion of each index varies between lakes and regions. The Sudbury lakes are dominated by Macrophytes+Periphyton+Algae (74.8%). The restoration efforts associated with lakes Hannah, Middle and Lohi were a potential source of nutrients that contributed to the highest values of

Table 7. Littoral habitat summary indices for the 59 lakes.

LAKE	QUADRAT FLOOR (dm ²)								WATER COLUMN (dm ²)			
	SLT+SND	GRA	COB+BOU	BDR+CLA	MAC	LOG	MAC+LOG	MSC	DET+PNS+LVS	MAC+PYT+ALG	LOG	COB+BOU
<u>SUDBURY</u>												
CLEARWATER	1185	515	515	90	195	0	195	0	145	2280	40	530
HANNAH	1180	175	575	240	280	40	320	0	290	2880	110	475
LOHI	1110	290	305	615	135	45	180	0	420	2305	215	300
MIDDLE	1150	300	730	170	100	30	130	10	205	2700	320	365
<u>CANADIAN SHIELD</u>												
<u>SMALL</u>												
CHUB	1415	100	275	10	405	295	700	0	1180	990	250	80
CLAYTON	1260	105	225	50	385	320	705	155	635	1285	155	20
CRADLE	1735	40	250	20	65	400	465	0	1310	255	470	180
DELANO	1500	70	480	10	210	215	425	0	1220	380	325	170
GLEN	1810	210	0	0	235	245	480	0	875	610	380	5
HAMER	1470	0	20	210	590	200	790	0	1520	1095	260	10
HENEY	1290	65	220	85	475	215	690	150	630	2740	270	90
MOUSE	1545	25	240	15	235	430	665	0	1310	735	250	55
PLASTIC	1290	35	395	265	260	245	505	0	1420	840	265	145
RANGER	1640	195	60	0	350	225	575	0	935	725	285	20
RED CHALK EAST	1110	205	940	0	130	45	175	70	1140	940	170	310
SKIDWAY	1330	420	110	630	0	10	10	0	1120	25	215	80
<u>MEDIUM</u>												
BASSHAUNT	1535	70	345	60	170	240	410	70	655	630	405	260
BEAR	1250	175	265	0	185	275	460	0	1315	705	260	150
BLUE CHALK	1755	280	205	15	175	45	220	25	1380	845	325	35
BUCK	1590	55	455	0	270	130	400	0	1250	1300	385	230
CLEAR	1515	240	290	0	245	210	455	0	770	575	285	150
CROSSON	1325	195	495	115	275	15	290	80	920	1875	165	365
DICKIE	1155	280	590	210	265	0	265	0	155	2155	85	490
FAWN	1280	165	55	395	580	15	595	10	245	1605	30	0
HARP	1640	95	415	45	255	50	305	0	475	2105	130	305
MEACH	1655	85	235	0	375	145	520	0	680	680	305	115
MOOT	1355	165	555	120	240	10	250	60	610	840	90	165
PEARCELEY	1180	135	800	220	90	40	130	0	530	720	280	355
PINCHER	1630	40	415	100	50	255	305	0	1490	250	310	335
RED CHALK MAIN	1480	230	390	20	165	105	270	110	905	820	380	210
RIDOUT	1390	190	480	30	345	25	370	40	525	1305	285	310
WESTWARD	1470	150	420	115	145	200	345	0	1385	295	400	155
<u>LARGE</u>												
BIGWIND	1070	150	745	35	265	35	300	200	605	700	215	170
BOSHKUNG	1145	350	500	90	305	110	415	0	705	315	145	265
BRANDY	1340	35	0	510	540	75	615	0	715	1425	180	0
CROWN	1435	130	245	0	345	345	690	0	1020	535	395	35
DICKEY	1470	280	380	125	100	145	245	0	1175	275	400	200
HALLS	1665	205	230	20	310	70	380	0	1045	340	135	130
KAWAGAMA	1185	450	740	30	15	70	85	0	655	1330	300	455
KOSHLONG	1820	225	70	90	240	5	245	55	895	2135	35	115
LEONARD	1410	125	230	510	115	110	225	0	1270	415	255	265
LOUISA	1690	165	215	25	220	65	285	120	440	1505	195	150
SHERBORNE	1310	45	305	150	365	325	690	0	855	445	450	20
SMOKE	1460	230	505	0	155	150	305	0	735	1220	485	335
TIMBERWOLF	1825	45	220	0	215	125	340	70	505	575	410	235
TWELVE MILE	940	255	965	0	335	0	335	0	245	2200	30	200
YOUNG	2085	100	60	0	160	95	255	0	900	410	260	20
<u>KAWARTHAS</u>												
BALSAM	1190	330	360	175	170	70	240	205	185	2065	205	595
BUCKHORN	1045	345	780	110	125	105	230	0	600	790	125	425
CHEMUNG	1675	135	565	0	95	30	125	0	460	1070	270	355
SCUGOG	1830	130	180	0	325	35	360	0	105	845	60	130
<u>WETLANDS</u>												
AVERY P2-18	1315	50	10	290	520	315	835	0	525	945	200	5
DAWSON POND P2-5	1635	0	10	60	765	30	795	0	405	1100	350	10
DUCK	750	0	560	150	670	370	1040	0	330	975	415	115
PLOT 2 POND 19	890	0	0	830	730	50	780	0	420	1120	50	0
PLOT 2 POND 9	1300	0	0	0	430	770	1200	0	700	1490	240	0
RED CHALK POND 1	1150	280	0	0	745	315	1060	0	995	1220	350	0
RUSH	1140	0	20	260	970	110	1080	0	185	1300	115	0
SLIM	1175	230	180	0	855	60	915	0	270	1520	110	25

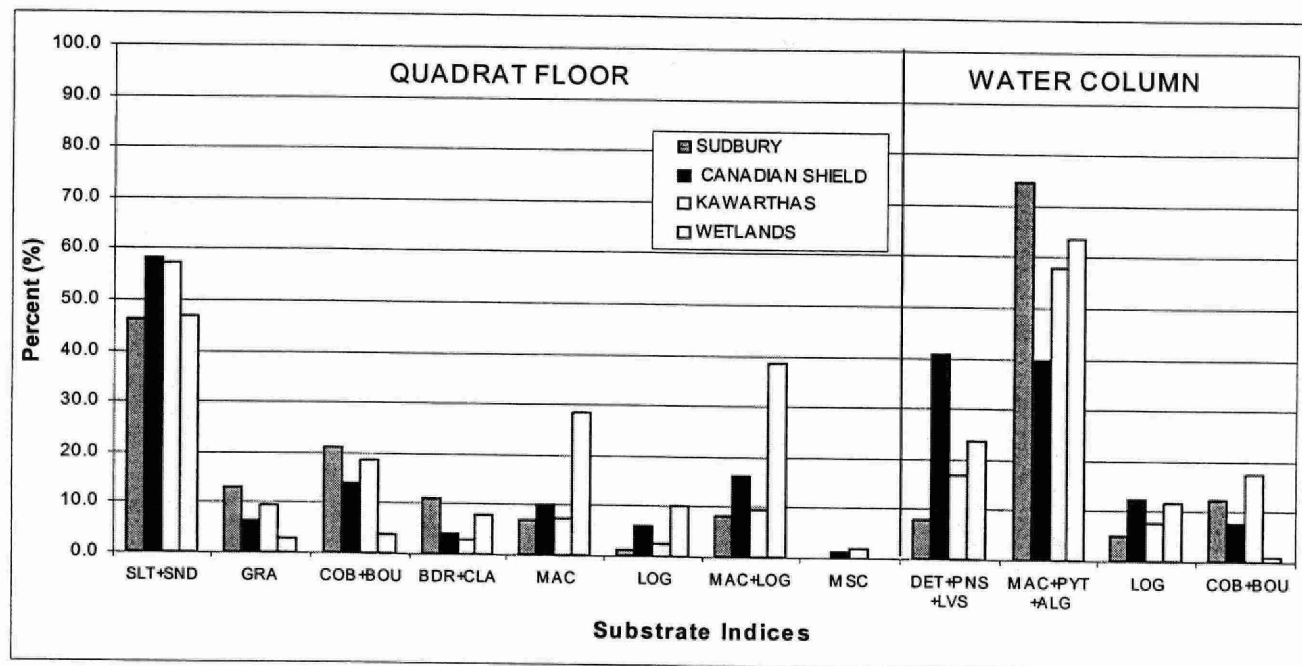


Figure 3. Littoral habitat summary indices for the 59 lakes separated by geological regions.

these indices for all lakes. The remaining habitats were Cobble+Boulder (12.4%), Detritus+Pine Needles+Leaves (7.8%), and Logs (5.0%).

The dominant water column metric of the 43 lakes within the Shield was Detritus+Pine Needles+Leaves at 40.7%. This index reflects the annual input of allochthonous material from the riparian zone. The second most abundant index, Macrophytes + Periphyton + Algae, was 39.6%. The other two metrics were Log (12.2%) and Cobble+Boulder (7.6%).

The four Kawartha lakes were dominated by Macrophytes+Periphyton+Algae which represented 58.1% of the observed material in the water column. The second most abundant group was Detritus+Pine

Needles+Leaves (16.9%) followed by Cobble+Boulder (7.7%) and Logs (17.3%).

Macrophytes+Periphyton+Algae (63.5%) formed the majority of the material in the water column of the wetlands. Detritus+Pine Needles+Leaves, Logs and Cobble+Boulder played a smaller role in the water column, making up 23.8%, 11.6% and 1.1%, respectively.

Substrate data QA/QC assessment –

The results of the sampler assessment are presented in Figure 4 and listed in Table 8. The procedure of estimating the 10 parameters for each of the quadrat floor and the water column runs the inherent risk of subjectivity. For example, the total for all parameters for the quadrat floor

Table 8. Substrate assessment QA/QC evaluation from Paint Lake. Substrate parameter values appear as percentages.

Site	Sampler	QUADRAT FLOOR							WATER COLUMN						
		SLT	SND	GRA	COB	BOU	MAC	LOG	PYT	MAC	LVS	LOG	DET	COB	BOU
1	KS	10	30	35	10	0	15	0	30	30	5	0	0	0	0
1	SD	10	10	20	30	0	20	0	30	10	5	0	10	0	0
1	RI	5	15	40	20	0	20	0	30	40	5	0	10	20	0
2	KS	15	20	35	15	0	15	0	10	25	5	5	5	0	0
2	SD	10	20	30	20	0	20	0	20	40	5	5	10	0	0
2	RI	5	45	25	5	0	20	0	25	30	5	5	5	0	0
3	KS	35	20	0	0	0	45	0	40	100	15	0	10	0	0
3	SD	35	15	0	0	0	50	0	10	100	20	0	10	0	0
3	RI	40	20	0	0	0	40	0	40	100	15	0	15	0	0
4	KS	45	15	0	0	0	40	0	15	80	5	20	0	0	0
4	SD	40	10	0	0	0	50	0	15	80	10	20	5	0	0
4	RI	15	15	0	0	0	40	20	20	75	15	10	0	0	0
5	KS	5	25	25	15	15	5	0	10	5	0	0	25	0	10
5	SD	10	20	15	15	30	10	0	20	10	0	0	10	5	15
5	RI	10	20	30	10	15	5	0	40	5	0	0	0	5	15

should be 100%; however, a sum of 90% was reported once by each sampler, although at different sites.

The resultant data for the 5 replicates at each of the 5 sites from each sampler were tabulated. Because the data are multivariate with a number of different parameters measured at different sites, we summarized the information using a correspondent analysis (CA) ordination (e.g. Reid et al. 1995). The first two axes from the CA (i.e. CA1 and CA2) represent the greatest amount of shared variation in the data set (Fig. 4). These two axes with the quadrat floor and water column variables were evaluated using variance components in an analysis of variance (ANOVA). The ANOVA partitioned variation between sampler and site and the results were plotted as in Reid et al. (1995). Variables falling near the 1:1 line in the plot indicate little disagreement among samplers. Those variables that lie closer to the X axis reveal greater differences among samplers.

The variance component plot (Fig. 4) shows that the eleven substrate parameters clustered to the right of the graph were identified by the samplers with little variance that can be attributed to sampler. Practically all variability for these parameters can be accounted for by variation among sites.

The variance component plot also reveals that the remaining five parameters (logs and sand on the quadrat floor; cobble, detritus and periphyton in the water column) all had substantially greater variation due to sampler. These five parameters were less effectively identified by samplers than the other eleven. For example, the three samplers unanimously reported logs in the water column at two sites, while only one sampler reported logs on the quadrat floor. By contrast, sand on the quadrat floor was reported within 5% at three of five sites. The site two estimate appears to be simply an over-estimation when compared with the estimates by the other two observers. As a result, the

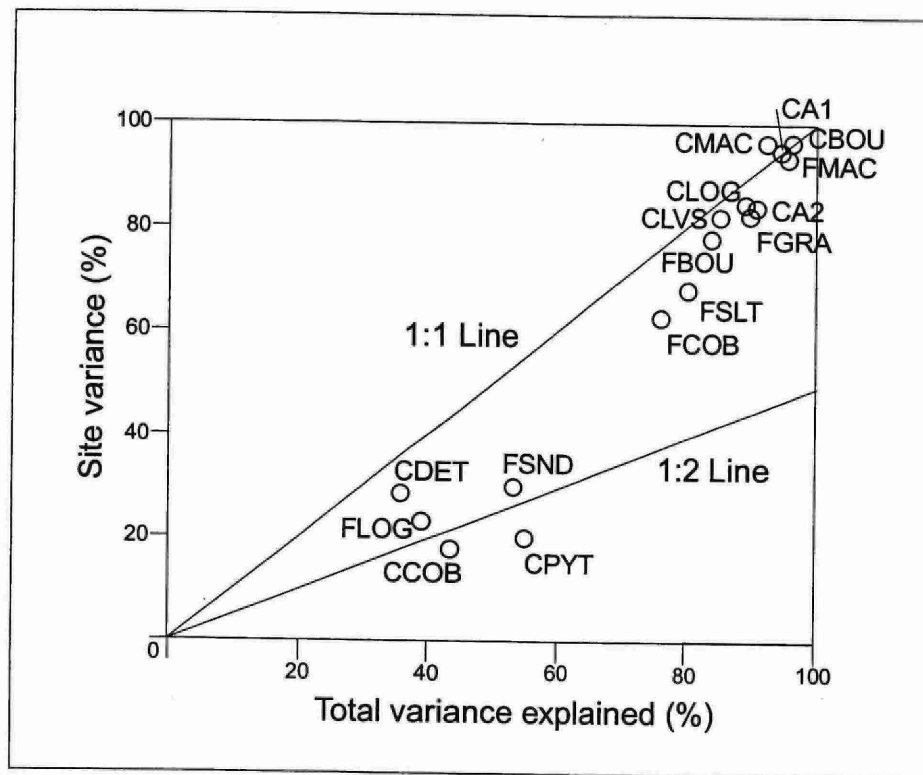


Figure 4. Substrate data analysis variance component plot of total variance explained and site variance. The letters F and C in front of a substrate acronym indicate quadrat floor or water column, respectively.

estimates for each of silt, gravel and cobble were reduced. These discrepancies, in part, explain some of the aspects creating variance between site and sampler.

SUMMARY AND RECOMMENDATIONS

This report summarizes physical and chemical data from lakes and wetlands distributed over a large geographic area. The tables indicate that there are large differences among these lakes, in

chemistry, morphology and nearshore substrate. Clearly these types of differences can be minimized by limiting the range of surficial and bedrock geology, vegetation and land use. Another way to limit this variability would be to focus on one or two watersheds with a common geological setting.

By focusing on a smaller geographic area and a larger number of lakes, the trends and patterns observed here should become clearer. Obviously, adhering to a standard operating procedure is essential

given the subjective nature of substrate assessment. Having the same individual identify the substrate should further minimize subjectivity and maximize data integrity.

Our results suggest that the relationship between water chemistry and substrate should be further investigated. For the 59 lakes studied, bedrock geology appeared to influence water chemistry; however, the relationship between water chemistry and predominant substrate type is still unclear. In addition, the apparent correlation between lake area and substrate type may be of interest. The greater wave action

and currents in larger lakes may produce littoral substrate that is distinct from that of smaller lakes. Factors such as lake depth, shape and position may also play key roles in substrate composition.

The substrate data that is summarized here should prove to be useful in assessments of littoral benthic macroinvertebrate communities. An obvious question that should be addressed is whether water chemistry or substrate have a greater influence on the observed benthic community. This will be the subject of a future report.

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Appendix 1:
Bedrock Geology, Watersheds and
Forest Regions of the 59 Lakes

The 59 lakes are situated in south-central Ontario, as seen in Figure 1. Lakes are located over the bedrock geology of two structural provinces of the Precambrian Shield, the Southern (Sudbury) and Grenville (Canadian Shield) Provinces, and the Great Lakes Lowland (Kawarthas) of the Phanerozoic Lowlands. The lakes range in size from 4 to 6374 ha and are distributed over nine tertiary watersheds. All study lakes are located within the Great Lakes - St. Lawrence Forest region.

Bedrock Geology

Southern Province – The geological setting of this province is described as rock knobs or ridges of rolling undulating, rugged topography of moderate elevation relief. Common throughout this region are low relief deposits of silt, silty clay and organic terrain. The four study lakes from this province are included within the Sudbury Nickel Irruptive (Springer 1978a) and the 2CF watershed.

Grenville Province – This area is mainly granitic in composition, usually composed of granitic gneisses and migmatites with marble, quartzite, amphibolite and various igneous intrusives (pegmatites, diorites and metabasics) of less importance (Jefferies and Snyder 1983, Springer 1978c). This province contains study lakes from six tertiary watersheds (2EA, 2EB, 2EC, 2HF, 2HK and 2KD).

Great Lakes Lowland – This lowland is formed from the fossiliferous strata of the Phanerozoic lowlands and contain Ontario's youngest sedimentary bedrock, the Cretaceous (Springer 1978d). Lakes from this region are contained in the 2EC, 2HF, 2HG and 2HH watersheds.

Watersheds

- 2CF** – Lakes flow through the Vermilion and Spanish River system to the Georgian Bay Islands in the north-east of Georgian Bay;
- 2EA** – Lakes in this watershed flow into the Distress and Upper Magnetewan Rivers and then into Georgian Bay and Lake Huron;
- 2EB** – After flowing into the Moon River or the Go-Home River, lakes flow into Georgian Bay and Lake Huron;
- 2EC** – In this watershed, lakes flow into the Severn River then into Georgian Bay and Lake Huron;
- 2HF** – Lakes flow into the Trent System from the Gull River and then into Lake Ontario;
- 2HG** – Lakes in this watershed flow into the Trent system from the Scugog River and then to Lake Ontario;

- 2HH** – After flowing directly into the Trent system, lakes in this watershed flow into Lake Ontario;
- 2HK** – In this watershed, lakes flow into the Trent System from the Dee River and then to Lake Ontario; and
- 2KD** – Lakes flow into the St. Lawrence River drainage basin via the Ottawa and the Upper Madawaska Rivers.

Forest Region

The Great Lakes – St. Lawrence Forest region – This region is characterized by the eastern white (*Pinus strobus*) and red pines (*Pinus resinosa*), eastern hemlock (*Tsuga canadensis*), tamarack (*Larix laricina*) and yellow birch (*Betula alleghaniensis*). These species are often associated with dominant broadleaved species common to the Deciduous Forest Region, such as sugar maple (*Acer saccharinum*), red maple (*Acer rubrum*), red oak (*Quercus rubra*), basswood (*Tilia americana*) and white elm (*Ulmus americana*). Other wide-ranging species include the eastern white cedar (*Thuja occidentalis*) and largetooth aspen (*Populus grandidentata*), and to a lesser extent, beech (*Fagus grandifolia*), white oak (*Quercus alba*), butternut (*Juglans cinerea*) and white ash (*Fraxinus americana*). Boreal species, such as the white (*Picea glauca*) and black (*Picea mariana*) spruce, balsam fir (*Abies balsamea*), jack pine (*Pinus banksiana*), trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*) and white birch (*Betula papyrifera*) are intermixed. In central portions, as well as in the east, red spruce (*Picea rubens*) becomes abundant (Rowe 1972).

Canadian Forestry Service subdivisions within this region in part explain the distribution and abundance of forest litter in the water column and upon the quadrat floor. These forest subdivisions are described as:

L.1 Huron-Ontario. This zone is well settled, and extensive forest tracts no longer exist. Sugar maple and beech are common over the whole area. Blue-beech, silver maple, slippery and rock elms, and black ash are found locally on river-bottom and swamp sites, and eastern white cedar is present in swampy depressions and on old fields (Rowe 1972). This zone contains the study lakes in the Kawarthas and Canadian Shield regions (Great Lakes Lowland and Grenville Province) located in 2HF, 2HG, 2HH and 2EC watersheds;

L.4b Algonquin-Pontiac. The Algonquin Highlands south of the Ottawa River show a greater degree of boreal influence than do other eastern parts of the Great Lakes - St. Lawrence Forest Region (Rowe 1972). Study lakes contained in this zone are located in the Canadian Shield region, in the 2KD watershed;

L.4d Georgian Bay. Eastern hemlock appears to increase in abundance

from the inland towards Georgian Bay, and along the thin soiled rocky shores there are scrubby stands of jack pine, trembling aspen, red oak, white birch, white spruce and black spruce. In southern and western areas, extensive swamp stands of red maple, black ash and eastern white cedar are present (Rowe 1972). This area includes lakes from the Canadian Shield that are contained within the tertiary watersheds 2EA, 2EB and 2EC; and

L.4e Sudbury-North Bay. Recent erosion has removed most of the soil and vegetation. Extensive disturbance by cutting, fire and smelter fumes has destroyed or reduced the abundance of many of the naturally occurring species, so that the tree cover is predominantly of the hardy pioneer species: trembling aspen and white birch (Rowe 1972). This zone contains the lakes within the Sudbury region (Southern Province) in the 2CF watershed.

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Appendix 2:
Littoral Habitat Data Summary Sheets
for the 59 Lakes

BALSAM LAKE 13-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																					65		50		60					175
BOULDERS																					30									30
CLAY																														
COBBLE						20	30	35	20	20											20	50	30	80	25	125				205
GRAVEL						60	60	40	60	65						5	5				5	10	5	10	5	285		10	35	
LOGS	10				5						20	5	5	5	10	5		5								15		45	10	
MACROPHYTES	30	30	15	25	35						5	5		5	5		5		5	5						135	20	15		
MISCELLANEOUS	5	5	5	10	5						15	40	25	50	35		5	5								30	165	10		
SAND	20	15	15	10	20	15	5	20	15	10	20	10	45	10	30	75	75	75	85	85	5	5	10	5	5	80	65	115	395	30
SILT	35	50	65	50	40	5	5	5	5	5	40	40	25	30	20	20	10	10	10	10	5	5	5	5	5	240	25	155	60	25

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	10	10	5	10	10	30	30	20	15	10	5	5		5	10	5	5	15	15	5						45	105	25	45	
BOULDERS						55	60	25	30												20						170		20	
COBBLE						25	40	65	65	55											20	60	20	30	25		250		155	
DETRITUS	5	5	5	5	5			5	5		35	10	10	10	10	5			5							25	10	75	10	
LEAVES	5		5		5	5			5		5		5	5		5	5	5	5	5						15	10	15	25	
LOGS		5									10	30	50	20	40	15		15	20							5		150	50	
MACROPHYTES	100	100	60	80	95						5	5		5	5	5	10	5	5	5						435	20	30		
PERIPHYTON						80	65	70	75	55	20	40	50	25	40	100	60	100	30	50	100	100	100	100	100		345	175	340	500
PINE NEEDLES																														

BASSHAUNT LAKE 25-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
QUADRAT FLOOR																														
BEDROCK			20		40																					60				
BOULDERS	5	35		10	20																					70				
CLAY																														
COBBLE	40	30	15	30	25						15	20	60	20	20											140		135		
GRAVEL											10	5		5	5	15	5	10	15									25	45	
LOGS						25	20	20	15	20						5				5	15	25	30	30	30		100		10	130
MACROPHYTES			5	5		10					5			5	5		20	10	10	40	15	15	15		10	10	10	15	80	55
MISCELLANEOUS			5			5	10	20	15	15																5	65			
SAND	45	30	15	40	10	10	10	10	10	5	60	65	30	60	60	75	60	60	60	5						140	45	275	260	
SILT	10	5	30	15	5	50	60	50	60	60	10	10	10	10	10	5	15	20	15	50	70	60	55	70	60	65	280	50	105	315

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE														5														5		
BOULDERS	5	35	20		40							15														100		15		
COBBLE	25	15	10	30	15						5		40	5												95		50		
DETRITUS	5	5	15	10	5	25	30	40	45	45	10	10	5	10	10	10	30	40	15	25	25	25	25	25	25	40	185	45	120	125
LEAVES	5	5			10	5		10	5	5	5	10	20	5	5	5	5	5	5	5						20	25	45	25	
LOGS	5	5	5			15	40	20	5	40	20	5		10	20	5	10	10		10	30	25	40	30	55	15	120	55	35	180
MACROPHYTES			10	10		15					5			10	10	10	50	25	15	90	20	30	30		20	20	15	25	190	100
PERIPHYTON						15	35	20	25		20	15	20	25	20					80							95	100	80	
PINE NEEDLES	5	5			5						5			5												15		10		

BEAR LAKE 01-NOV-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADTRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY	30	30	20	35	30	15	10	5	15	15	20	15	10	15	10	15	10	25	20							145	60	60	80	
COBBLE								40		30			30		60	15	20	30	30	10							70	90	105	
GRAVEL			15			25					25	15	10	10	5	20	10	10	10	20							15	25	65	70
LOGS	20	10		10	5	20	15	10	25		20	10						5			20	20	30	25	30	45	70	30	5	125
MACROPHYTES				15	30	20	20				15		20	10				25	10	20						45	40	45	55	
MISCELLANEOUS																														
SAND	30	30	50	25	20	10	30	20	25	40	25	20	10	30	10	40	35	10	15	10	50	60	50	50	40	155	125	95	110	250
SILT	20	30	15	15	15	10	25	25	35	15	15	35	15	40	10	15	20	10	10	20	30	20	20	20	30	95	110	115	75	120

	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS																														
COBBLE								20		20			20		30	15	10	10	20	5							40	50	60	
DETRITUS		15	20	20	20	20	25	15	5	10	15	10	10	5		5	10	10	10		50	50	60	55	60	75	75	40	35	275
LEAVES	20	20	20	5	10	20	20	5	20	20	20	15		50	5	10	40	30	30	5	30	50	30	40	40	75	85	90	115	190
LOGS	30	5		15	10	30	10	10	20		10	20	5	10	5		10	10			10	10	20	10	10	60	70	50	20	60
MACROPHYTES				10	20	25	15				10		15	5				15	5	10						30	40	30	30	
PERIPHYTON	40	30	10	30	20	30	25	25	20	25	35	25	25	25	35	30	20	15	20	40	10	10	10	10	10	130	125	145	125	50
PINE NEEDLES	10	10	20			20	10	15	10	10	20	5		5		5		25	20	5	10	20	10	10	20	40	65	30	55	70

BIGWIND LAKE 20-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK										20								15									20		15	
BOULDERS						40		45	10		15	10			15						15						95	40		15
CLAY																														
COBBLE							30		20	30	50	25	20	25	60						70	70	65	60	70		80	180		335
GRAVEL											5	25	20	30	10						5	15	10	15	15			90		60
LOGS					15													5	5	10						15			20	
MACROPHYTES	5	40	45	5	25				10	5		5	30			20	40	5	5	5			5	10	5	120	15	35	75	20
MISCELLANEOUS		5				15	10	10	10	10						30	20	30	30	30						5	55		140	
SAND	90	40	50	60	55	5					25	30	25	40	10						5	10	10	10	5	295	5	130		40
SILT	5	15	5	20	20	40	60	45	50	35	5	5	5	5	5	50	40	60	45	55	5	5	10	5	5	65	230	25	250	30

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE		10	20		10		5		5																		40	10		
BOULDERS						15		45	40	20					50												120		50	
COBBLE							5			10			10														15	10		
DETRITUS	5	5		25	10	15			30	10	10	5	15	5	20	20	20	70	60	50	15	5	5	10	10	45	55	55	220	45
LEAVES	20	5	5	80	5		5	5	5	5	5	5				5	5	5	5	5	10	5	10	5	15	115	20	10	25	45
LOGS	10	5					5	5	20	5						5		5		30				10		15	35		40	10
MACROPHYTES	5	90	100	5	55	55			20	10		10	60			40	90	10	5	10			15	15	5	255	85	70	155	35
PERIPHYTON						15		40	30	30	60	50	15	40	60						30	60	40	60	50		115	225		240
PINE NEEDLES	5			10												5	5	5	5	5						15			25	

BLUE CHALK LAKE 07-NOV-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY																														
COBBLE																														
GRAVEL																														
LOGS																														
MACROPHYTES																														
MISCELLANEOUS																														
SAND																														
SILT																														

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS																														
COBBLE																														
DETRITUS																														
LEAVES																														
LOGS																														
MACROPHYTES																														
PERIPHYTON																														
PINE NEEDLES																														

BOSHKUNG LAKE 24-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK	20	20	20	10	20																									
BOULDERS											10					20		20									10	40		
CLAY																														
COBBLE		20	30	30	20	30	30	40	30	25	10		25			20	20		10		20	30	10	30	20	100	155	35	50	110
GRAVEL	20	30	20	30	30	20	30	30	10					20	20	10	10		10	10			10	30	10	130	90	40	40	50
LOGS											10	10	10	10	20	5	10		10		5	10			10			60	25	25
MACROPHYTES	10					5	5	5	30	30	25	30	10	20	20	10	10	40	30	20	5					10	75	105	110	5
MISCELLANEOUS																														
SAND	40	20	30	30	30	25	20	15	15	20	20	20	25	25	20	30	20	20	20	20	40	20	30	20	20	150	95	110	110	130
SILT	20					20	15	10	15	25	35	30	30	25	20	25	30	20	20	30	30	40	50	20	40	20	85	140	125	180

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
WATER COLUMN																															
ALGAE																	5	10											15		
BOULDERS	10	10	10	20	20										20						70							20			
COBBLE			20	10	20	5	10	20	10	10								20	10	20	20	50	55					70			
DETRITUS	5			5	10	10	20	20	10	15	20	20	20	15	20	15	10	15	20	10	5	10	20	20	10	20	75	95	70	65	
LEAVES	10	20	20	10	10	10			10	10	10	10	20	10	10	15	15	10	10	10	10	5			10	70	30	60	60	25	
LOGS											10	20	20	20	20		15				20	20						90	15	40	
MACROPHYTES		5				10	5	10	40	40	20	20	10	20	20	15	10	20	20	20						5	105	90	85		
PERIPHYTON											10										5							10		5	
PINE NEEDLES	10	10	5	10		5	5		10	10				5		10		5	5	5	5	5	5	10	10	10	35	30	5	25	40

BRANDY LAKE 25-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY	60	50	55	55	50						10	10	10	10	10	5	10	15	25	25	20	20	25	20	25	270		50	80	110
COBBLE																														
GRAVEL																					10	10	5	5	5					35
LOGS								5			15	10	5	10	15	10	5										5	55	15	
MACROPHYTES	20	15	20	20	20	35	40	40	35	35	30	25	30	25	20	30	25	25	25	20				5		95	185	130	125	5
MISCELLANEOUS																														
SAND	10	25	5	5	15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	50	40	40	40	30	60	25	25	25	200
SILT	10	10	20	20	15	60	55	50	60	60	40	50	50	50	50	50	55	55	45	50	20	30	30	35	35	75	285	240	255	150

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE						20	15	20	20	25	15	10	15	10	10	10	15	15	10	5							100	60	55	
BOULDERS																														
COBBLE																														
DETRITUS	10	10	10	15	15	20	20	25	25	25	25	25	20	25	20	25	25	25	25	20	5	10	10	5	15	60	115	115	120	45
LEAVES	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	15	5	10	15	10	20	15	15	30	25	25	25	55	105	
LOGS		10		5		5					15	25	10	5	10	20	25	20	15	15						15	5	65	95	
MACROPHYTES	50	55	50	50	50	75	85	85	80	80	65	55	65	50	45	65	50	50	50	45				10		255	405	280	260	10
PERIPHYTON																														
PINE NEEDLES	5	5	5	5	5																					25				

BUCK LAKE 08-NOV-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>QUADRAT FLOOR</u>																															
BEDROCK																															
BOULDERS	15	40	20	50					10	25					10			25						20		125	35	10	25	20	
CLAY																															
COBBLE	15	20	60	5	20	15	10		30	15								5	5	15			20		5	120	70		25	25	
GRAVEL		5	10	5	5														10	5			5	5	5	25			15	15	
LOGS						10	15	15	10	5				5		10	10					30	10		10			55	5	20	50
MACROPHYTES						30	15	5			50	30	40	40	45		10	5									50	205	15		
MISCELLANEOUS																															
SAND	40	20	5	25	45	10	10	10	5	5	5	5	5	5	5	10	10	10	25	25		10	15	20	20	25	135	40	25	80	90
SILT	30	15	5	15	30	35	50	70	45	50	45	65	55	50	40	80	70	55	60	55		60	75	55	65	45	95	250	255	320	300

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>WATER COLUMN</u>																															
ALGAE											5																	5			
BOULDERS	10	30	10	40						10	20														15	90	30			15	
COBBLE	5	5	50		5					15	5													10		65	20			10	
DETRITUS	40	15	10	10	20	30	25	40	30	30	20	10	10		10	20	15	15	10	10		40	30	5	40	5	95	155	50	70	120
LEAVES	30	10	20	15	10	5	10	5	10	25	5	10	5	5	5	80	75	75	80	90		30	10	30	15	50	85	55	30	400	135
LOGS	40	5	15	15	15	20	25	30	20	15				10		10	15	20	25	5		20	30	10	30	10	90	110	10	75	100
MACROPHYTES						50	30	10			100	60	80	80	90		25	20								5		90	410	45	5
PERIPHYTON	30	30	50	60	25	25	25	20	20	30	80	30	40	60	75							25	50		40	30	195	120	285		145
PINE NEEDLES												5	5	5					15	20					5			15	35	5	

BUCKHORN LAKE 06-NOV-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS				20		20			20				40	20		50	20		5						10	20	40	60	75	10
CLAY																					35	30	15	15	15				110	
COBBLE	10	25	10	15	60	10	30	15	40	35	50	20	20	30	60	20	30	30	20	30					15	120	130	180	130	15
GRAVEL	10	15	20	15	10	25	20	30	20	15	10	10	10	15	20	10	10	10	10	10	10	15	10	5	10	70	110	65	50	50
LOGS	10		10	10	5	15				10		10		10					10		5	10				35	25	20	10	15
MACROPHYTES	15	20	20	10							10												20	20	10	65		10		50
MISCELLANEOUS																														
SAND	15	20	10	10	10	30	10	30	10	20	20	40	20	15	10	10	30	40	40	35	30	35	30	25	20	65	100	105	155	140
SILT	40	20	30	20	15	20	20	25	10	20	10	20	10	10	10	10	10	20	25	15	20	20	25	35	20	125	95	60	80	120

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE														10	15													25		
BOULDERS				10									20	10		20	10	15	5					5	10		30	50	5	
COBBLE	20	30	5	10	40	5	15	10	20	20	20	10	10	20	30	10	15	10	10	15				5	105	70	90	60	5	
DETRITUS	40	35	25	15	10	15	10	10	5	10	15	10	5	5	15	10	5		15		5	15	10		5	125	50	50	30	35
LEAVES	30	35	20	20	15	5	5		5	10			10		20	30	10	10	5	5	5	25	5		5	120	25	30	60	40
LOGS	15		5	5	5	10				10	5	10		10	5					20		20	5			30	20	30	20	25
MACROPHYTES	20	25	10	5							5	5									5		10	10	5	60		10		30
PERIPHYTON	15	20	10	15	10	5	20	15	20	15	10	10	50	40	60	70	50	40	45	30	15	25	20	15	40	70	75	170	235	115
PINE NEEDLES													5		10	5		10		5							15	20		

CHEMUNG LAKE 06-NOV-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS				20																15	25					20				40
CLAY																														
COBBLE	30	5	5		5	60	90	45	55	85	15	40	10		30						5	10	5	10	45	335	95		30	
GRAVEL					20	15		10	10	5	5	5	25	5	10	5	5	5	5	5					20	40	50	25		
LOGS																15					15							15	15	
MACROPHYTES	5	5		5							5	5		5		5	5	5	10	10		5	10	5	10	15		15	35	30
MISCELLANEOUS																														
SAND	50	75	55	55	60	20	5	30	25	5	65	40	55	80	50	75	60	70	70	70	55	65	45	45	45	295	85	290	345	255
SILT	15	15	40	20	15	5	5	15	10	5	10	10	10	10	10	15	15	20	15	15	30	25	20	20	35	105	40	50	80	130

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS				20															10	15					20					25
COBBLE	25	5			5	50	60	25	30	50	5	20	5		15						5	5		5	35	215	45		15	
DETRITUS	5	5	5	5	15	10	10	15	10	15	10	10	5	5	35	15	15	15	10	15	20	10	10	10	10	35	60	65	70	60
LEAVES					10						5	5	5	5	5	10	10	10	15	10	50	5	10	5	5	10		25	55	75
LOGS	5			10	15	5	5	5	10	10	10	5	5	30	40	5	20	15	10	5	25	15	10	5	5	30	35	90	55	60
MACROPHYTES	10	10		10							10	10		10		10	10	10	15	15		10	20	10	20	30		30	60	60
PERIPHYTON	60	25		35	20	75	90	75	60	90	45	60	50	50	60						10	10	20	25	30	140	390	265		95
PINE NEEDLES																					5									5

CHUB LAKE 02-NOV-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>QUADRAT FLOOR</u>																															
BEDROCK										10																	10				
BOULDERS			10					5		15	10				10	10	15	15	10	15		15	10				10	20	20	65	25
CLAY																															
COBBLE						30	40	10	30	20											5						130		5		
GRAVEL						20	20	25	30															5			95		5		
LOGS	5	20	10	10	10	10	10	20	10	10	15	20	10	20	15	30	15	10	10	10	5		5	5	10	55	60	80	75	25	
MACROPHYTES	50	30	25	20	25	10	10	10	15	10	25	35	30	35	20	10	10	10	10	15						150	55	145	55		
MISCELLANEOUS																															
SAND	10	15	15	30	30	30	20	30	15	35	15		10	10	15	40	30	25	35	30	95	80	85	95	85	100	130	50	160	440	
SILT	35	35	40	40	35						35	45	50	35	40	10	30	40	35	30						185		205	145		

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS										10						5		5			15	5				10		10	20	
COBBLE										20	20															40				
DETRITUS		20		20	30	40	20	30	30	25	20	30	30	30	35	20	30	40	25	40		5			70	145	145	155	5	
LEAVES	15	10	15	20	50	15	20	5	10	10		5	10	20	15	20	5	20	30		100	15	45	100	60	110	60	50	75	320
LOGS		20	10		10	10	10	15	20	10	20	10	5	20	20	5	5	5	5	20	5		5	10	10	40	65	75	40	30
MACROPHYTES	100	50	60	80	35	20	15	15	30	15	50	80	60	45	40	40	40	20	30	25						325	95	275	155	
PERIPHYTON	5	20	20	15	10				5	10	15		15				10		5	10						70	15	30	25	
PINE NEEDLES													5	5					5	5	5		5	10	5		10	10	25	

CLAYTON LAKE 18-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																					50									50
BOULDERS								5										25	10							5		35		
CLAY																														
COBBLE			20			10	30	5	10									30	40	30	10				20	55		100	10	
GRAVEL						25	25	5	30	10										10						95		10		
LOGS	5	15		5	10			10		10	35	15	30	35	30	20	10					20	30	20	20	35	20	145	30	90
MACROPHYTES	40	45	25	40	40			5	20		15	30	25	40	30	30										190	25	140	30	
MISCELLANEOUS	5	5	5	5	5	5					15	10	5	5	10						10	10	10	10		25	5	45		40
SAND						35	25	15	30	60						25				20	25					165		45	25	
SILT	50	35	50	50	45	25	20	55	10	20	35	45	40	20	30	40	50	40	40	40	15	70	60	70	70	230	130	170	210	285

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE	60	75	40	60	70	10	10	15	50		25	60	40	60	60	10	15	10	15	15			10	20	5	305	85	245	65	35
BOULDERS																			20									20		
COBBLE			5				45	10	5				5				5	25	65	20	5			10		5	60	5	115	15
DETRITUS	10	10	5	15	5	20		10	10	25	20	10	10	10	10	20	25	15	20	15	15	10	5	30	60	45	65	60	95	120
LEAVES	5	5	5	5	5	5	5		5	15	15	5	5	5	5	5	5	10	5	5	5	5	5	15	5	25	30	35	30	35
LOGS	10	5				35		20		30			35		20	30	15	5		20	40	40	60	60	20	15	85	55	70	220
MACROPHYTES	80	95	55	90	100	5		5	50		35	100	55	100	70											420	60	360		
PERIPHYTON						40	30		20	40						30	15	30	60	20	50	30	20	20	30		130		155	150
PINE NEEDLES																		5	5	5				5					15	5

CLEAR LAKE 18-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS						10				10	20															20	20			
CLAY																														
COBBLE	10	40	10	30	30	10	30	10	30	20					10						10	10			10	120	100	10		30
GRAVEL	30	20	30	30	30										30	20	20	20	10							140		30	70	
LOGS						10	10	10	10	10	10	10	10	10		20	20	10		10	10	10	20	10	10		50	40	60	60
MACROPHYTES		10	5	5	10						20	10		10	5	20	20	20	20	20	10	10	10	30	10	30		45	100	70
MISCELLANEOUS																														
SAND	50	30	40	10	20	60	40	80	60	50	70	20	40	30	30	60	40	50	40	40						150	290	190	230	
SILT	10		15	25	10	20	10			10	60	30	50	25					20	20	80	70	70	60	70	60	40	165	40	350

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE		10			10																10		10	10		20				30
BOULDERS										20																20				
COBBLE	20	20	10	30	10	10				10			10		10											90	20	20		
DETRITUS	10	10	10	5	10	10	10	10	15	10	10	30		20	20	10	20		20	20	30	30	30	30	30	45	55	80	70	150
LEAVES						20	10	5	20	10			20	20		10	10	5	10	10	20	10	20	5	10		65	40	45	65
LOGS						20	15	10	20	20	10	20	10			10	20	20	20	10	10	30	20	10	10		85	40	80	80
MACROPHYTES	10	10	10	10	10						30	10	10	20	10	30	20	20	20	40	20	20	10	30	20	50		80	130	100
PERIPHYTON	10		10	10	10						10	10	10			15		20	10	10	10	10	10	10		40		30	55	40
PINE NEEDLES						20	10	5	10	10	20		10	5	5	5		10			10	10	20		5		55	40	15	45

CLEARWATER LAKE 05-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK								90																			90			
BOULDERS								25			30					15											25	30	15	
CLAY																														
COBBLE	10	30	5	10	30	50	20		40	40	15			20	15	30	40	25	50			5		10		85	150	35	160	15
GRAVEL	10	30	40	25	20	30	40		20	40	20	25	10	5	25	30	40	20	25	30	10	5		10	5	125	130	85	145	30
LOGS																														
MACROPHYTES	15		5	10							20		25	15							20	30	35	15	5	30		60	105	
MISCELLANEOUS																														
SAND	20	25	40	20	40	15	30	5	10	15	25	20	25	30	35	40	20	20	30	15	40	30	20	30	40	145	75	135	125	160
SILT	45	15	10	35	10	5	10	5	5	5	35	10	40	50	20	15	10	5	20	5	30	35	40	45	40	115	30	155	55	190

	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	10	25		5							10	5	10	5			5		5		5	5	10	10	5	40		30	10	35
BOULDERS								25			30							15					10				25	30	15	10
COBBLE	10	30	5	15	30	40	15	5	30	30	20			30	15	40	35	15	50			5	30			90	120	50	155	35
DETRITUS	5		5	5	5						5		10	15		5	5	5	15	5		20		30		20		30	35	50
LEAVES	5							5																		5	5			
LOGS	5	5						5	10					15												10	15	15		
MACROPHYTES	30		5	10							40		50	25				5			40	70	80	30	10	45		115	5	230
PERIPHYTON	75	75	60	60	75	60	40	90	70	60	75	90	50	50	90	50	75	65	75	65	90	50	90	90	100	345	320	355	330	420
PINE NEEDLES																														

CRADLE LAKE 26-OCT-93

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK					10						10															10		10		
BOULDERS	5		10	20		5					10	20	15	10	10	10		10		10		10	20	15		35	5	65	30	45
CLAY																														
COBBLE					5						20	5	5	5			5				10		15			5		35	5	25
GRAVEL															5								30	5			5		35	
LOGS	40	35	25	15	5	15	10	10	25	35	10	10	15	15	15	10	25	15	20	10	10	15		5	10	120	95	65	80	40
MACROPHYTES																					20	20	20	5					65	
MISCELLANEOUS																														
SAND	25	15	35	25	30						20	10				5					45	55	35	15	30	130		30	5	180
SILT	30	50	30	40	50	85	85	90	75	65	30	55	65	70	70	80	70	70	80	80	15	10	10	30	55	200	400	290	380	120

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE						10	5	5							5											20		5		
BOULDERS				15	10		5				10	15	10	5	5	10					20	20				25	5	45	10	40
COBBLE											10										15	30					10		45	
DETRITUS	35	20	25	25	40	70	90	90	70	60	30	30	40	50	60	80	80	70	60	80	5	30		20	10	145	380	210	370	65
LEAVES	15	5	10	5		10	5			5				5	5	5	5	5	5	5	5	5	5	5	5	35	20	10	25	25
LOGS	40	35	15	25	5	15	15	5	30	40	20	10	20	25	30	15	15	10	20	5	10	20	5	10	30	120	105	105	65	75
MACROPHYTES										5									5		85	30	30	5	70		5		5	220
PERIPHYTON																														
PINE NEEDLES		5	5		5		5									5										15	5		5	

CROSSON LAKE 20-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
QUADRAT FLOOR																															
BEDROCK									40	5					70												45	70			
BOULDERS	35	30	20	10	15	20													10							110	20		10		
CLAY																															
COBBLE	30	50	40	20	30	20	15	20	25	45									30		20		10			170	125		30	30	
GRAVEL				5		30	30	30	15	20								15	15		30		5			5	125		30	35	
LOGS												5											10					5		10	
MACROPHYTES	15		10	10							50	50	50	30	5		10				30		5		10	35		185	10	45	
MISCELLANEOUS					10													5	5		10		20	20	10	10			10	60	
SAND	5	5	20	25	10	20	40	30	15	25	20	20	20	10	5	85	75	70	80	40	20	35	20	50	5	65	130	75	350	130	
SILT	15	15	10	30	35	10	15	20	5	5	30	30	25	60	20	15	15	10	15	5	40	15	55	15	65	105	55	165	60	190	

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	45	30	20		30	60	40	10	30	10	30	50	30	20	30	5	15		20	10	40	20	5	30	15	125	150	160	50	110
BOULDERS	30	55	40	10	15	20			45	5									10				20			150	70		10	20
COBBLE		20		10	15	5		10	10	25		5							5		10					45	50	5	5	10
DETRITUS	10	5	10	20	25	10	20	20			15	20	15	10	15	30	55	40	55	30	20	40		20	10	70	50	75	210	90
LEAVES	15	5	5	20	15	5		5	15	20	5	5	20	5	40	15	5	5	5	5	5	30	5	30	55	60	45	75	35	125
LOGS			5		5		15	5		5	5	5		5	5	10	10	45	15	5	10		10		5	10	25	20	85	25
MACROPHYTES	40		15	15		10	20				90	100	90	60	10	5	15				65	5	10	20	20	70	30	350	20	120
PERIPHYTON	20	80	60	60	50				40	60	50					15	15	45	15	45	40	15	20	30	30	270	150		135	135
PINE NEEDLES		5		5	5	5		5	5	5		5	5		5	5					5	5	5	5	5	15	20	15	10	25

CROWN LAKE 26-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS						10					20									25						10	20	25		
CLAY																														
COBBLE	10				10						10		20	15		10	20		30	25	20	20				20		45	85	40
GRAVEL																10		10	10		20	20	20	20	20				30	100
LOGS	20	20	30	20	25	30	10	20	20	20	20		20	10	20	10	10	5	10	10		10		5		115	100	70	45	15
MACROPHYTES		20	10	20	10	5	5		30	25	10	30	20	30	30						20	20	20	20	20	60	65	120		100
MISCELLANEOUS																														
SAND						30	20									70	70	85	50	40	30	20	50	45	50	50		315	195	
SILT	70	60	60	60	55	65	55	50	50	55	60	50	40	45	50						10	10	10	10	10	305	275	245		50

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE																														
BOULDERS																10	10											10	10	
COBBLE	5															10										5		10		
DETRITUS	30	30	30	30	30	30	30	30	30	30	30	20	30	30	30	20	20	20	20	20	10	10		20	20	150	150	140	100	60
LEAVES	10	10	20	10	10	10	15	20	20	10	20	10	10	20	30	20	10	10	10		10	10	10	20	20	60	75	90	50	70
LOGS	30	20	30	20	20	30	20	20	10	20	10	10	10	10	10	20	20	10	20	10		10	10	20	5	120	100	50	80	45
MACROPHYTES		10	10	30	10		10	10	30	30	10	30	20	20	20						10	20	20	20	20	60	80	100		90
PERIPHYTON		20	15	20	20	10	10	10	10	10	10		10					5	10		10	10	10	10	5	75	50	20	15	45
PINE NEEDLES	10		5	5	5									5		10	5	5					5	20		25		5	20	25

DELANO LAKE 26-OCT-93

A2-18

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK										10																	10			
BOULDERS						10	10	10	30							10	40	20	20	30	10		10	30	30		60		120	80
CLAY																														
COBBLE			5	5	15			5	5	20							20		20		15	10	40	30	30	25	30		40	125
GRAVEL	5	5	20	10	5		10									15										45	10		15	
LOGS	5	10	5	10	10	20	20	5	5	10		10				20	10	5	10	10	10	5	10	15	10	40	60	10	55	50
MACROPHYTES	30	60	20	15	30						5	10	10	5		5		10		5			5			155		30	20	5
MISCELLANEOUS																														
SAND	50	25	40	60	40	20		10		20						20	10	5	20		25	65	35	20	30	215	50		55	175
SILT	10	5				50	60	60	60	40	100	95	80	90	95	30	40	40	50	35	40	20		5		15	270	460	195	65

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE										10	5		10														10	15		
BOULDERS						20			15	15						15		20	5			20				50		40	20	
COBBLE					15				5	10											10		10	10		15	15		30	
DETRITUS	5	5	5		10	30	30		30		80	80	40	40	80	50	40	70	70	40	60	80	70	40	70	25	90	320	270	320
LEAVES	20	10		15	5	10	5	5	10	15					5	5	5	5	5		5	10	10		10	50	45	5	20	35
LOGS	5	5	5	30	15	30	10	20	5	10	5	10				30	30	10	10	10	10	10	15	20	30	60	75	15	90	85
MACROPHYTES	5	80	50	20	10					10	10	50	70	5		10		5	5	10			5			165	10	135	30	5
PERIPHYTON													10															10		
PINE NEEDLES	5	5	5			5		5								5							5	5		15	10		5	10

A2-19

[illegible]

DICKEY LAKE 23-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK				50	25	50																				75	50			
BOULDERS	30				10					25	25	20	10	10	15						20					40	25	80		20
CLAY																														
COBBLE			15	5	5		15	15	25	10	10	10	15	10	5						5	20	10	25	15	25	65	50		75
GRAVEL	5	5	10	5	5						40	45	50	40	50						5	5	5	5	5	30		225		25
LOGS	5	10				5	10	15	10	5						20	25	10	25	5						15	45		85	
MACROPHYTES		5				10	5									10	20	5	5	30	5		5			5	15		70	10
MISCELLANEOUS																														
SAND	40	55	50	35	45	10	30	30	30	20	15	15	15	20	20	30	20	40	25	15	45	45	55	45	45	225	120	85	130	235
SILT	20	25	25	5	10	25	40	40	35	40	10	10	10	20	10	40	35	45	45	50	20	30	25	25	35	85	180	60	215	135

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	5																									5				
BOULDERS	25									20	20	10	5	5	10						10					25	20	50		10
COBBLE			5		5		5	10	20	10	10	5	5	5							5		10			10	45	25		15
DETRITUS	10	20	30	10	10	20	20	25	20	15	5	15	10	15	10	30	40	30	20	25	5	35	30	30	15	80	100	55	145	115
LEAVES	40	50	5	5	5	10	20	30	30	35	10	30	15	40	45	40	30	30	20	5	60	5	5	5	5	105	125	140	125	80
LOGS	10	50	40		20	5	20	10	20	10	10	15	10	15	5	15	20	5	30	10	15	20	15	25	5	120	65	55	80	80
MACROPHYTES		10				15	5									20	20	5	5	20	10		10			10	20		70	20
PERIPHYTON	5	5	5	10	10	5	5						5	5	5	10	10	5	5	5		15	15	15	10	35	10	15	35	55
PINE NEEDLES	5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5	10	10	5						25	20	25	35	

FAWN LAKE 03-NOV-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY		30	15	10	10	10	50	45	50	45											20	20	30	30	30	65	200		130	
COBBLE	10	10	5		15																5			10		40			15	
GRAVEL											20	15	5	25	5	15	40	10	15	15								70	95	
LOGS					5												10									5		10		
MACROPHYTES	25	25	40	10	25	50	30	30	30	35	15	20	30	10	10	20	5		5		35	45	30	30	25	125	175	85	30	165
MISCELLANEOUS																5		5										10		
SAND	15	10	10	10	10	10					50	55	55	60	70	30	35	30	25	50	5	5	5	5	5	55	10	290	170	25
SILT	50	25	30	70	35	30	20	25	20	20	15	10	10	5	15	30	20	50	50	35	35	30	35	30	30	210	115	55	185	165

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE		15	40	40	30	15	20	20	25	25	15	20	20	5	15	25	5	10	15		20	5	15	20	15	125	105	75	55	75
BOULDERS																														
COBBLE																														
DETRITUS	10	10	10	10	10	5	10	10	5	5	5	5	10	5	5	15		15	5	10	20	15	15	15	10	50	35	30	45	75
LEAVES	5	5																								10				
LOGS	5			5													5	5	5			5				10		15	5	
MACROPHYTES	50	60	80	20	50	90	60	60	60	70	30	40	70	20	20	40	5		10		70	90	60	60	55	260	340	180	55	335
PERIPHYTON																														
PINE NEEDLES																														

GLEN LAKE 16-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY																														
COBBLE																														
GRAVEL	5	5	5	5	10	5	10	15	15	15	5	15	10	10	10	5	5	5	5	5	5	15	10	10	5	30	60	50	25	45
LOGS	10	5	10	15	15	10	10	5	15	5	10	5	10	10	5	5	5	10	20	10	10	10	15	15	5	55	45	40	50	55
MACROPHYTES		20	5	5	5	5		5	5	5	15	20	20	10	5	10	5	15	5	10	20	10	10	15	10	35	20	70	45	65
MISCELLANEOUS																														
SAND	35	30	30	20	20	30	40	35	30	30	20	20	20	30	30	15	20	15	15	15	15	25	20	10	20	135	165	120	80	90
SILT	50	40	50	55	50	50	40	40	35	45	50	40	40	40	50	65	65	55	55	60	50	40	45	50	60	245	210	220	300	245

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE					10																					10				
BOULDERS																														
COBBLE																5												5		
DETRITUS	25	25	25	25	25	20	20	25	25	25	15	15	15	10	20	35	30	35	30	30	25	20	30	30	30	125	115	75	160	135
LEAVES	5	5	5	5	5	5	5	5	5	5		20	5	5	5	15	15	15	5	10	5	5	5	10	20	25	25	35	60	45
LOGS	10		15	15	20	25	15	10	10	15	10	10	20	10	10	25	15	30	20	20		20	15	30	10	60	75	60	110	75
MACROPHYTES	5	45	5	10	5	5		5	15	10	10	10	15	5	5	25	10	30	15	20	10	10	10	15	20	70	35	45	100	65
PERIPHYTON	5	10	5	10	15	5	5	5	5	5	20	25	20	20	20	20	10	20	10	10	15	10	5	5	5	45	25	105	70	40
PINE NEEDLES	5	5	5	5	5											5		25			5	5	5	5		25		30	20	

HALLS LAKE 24-OCT-95

A2-23

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
QUADRAT FLOOR																															
BEDROCK				20																						20					
BOULDERS										40																40					
CLAY																															
COBBLE				20		40	30	30	20							30	20									20	120		50		
GRAVEL						15	20	20	40	20						20	20				10	10	10	10	10		115		40	50	
LOGS	10	10		10	10					10		10						10								40	10	10	10		
MACROPHYTES	10	5	5		10	10	20	20	10		50	20	20	30	20	20	20	10	20	10						30	60	140	80		
MISCELLANEOUS																															
SAND	80	85	75	70	80	35	30	30	30	30	50	40	60	40	50	20	30	60	30	70	80	80	80	80	80	390	155	240	210	400	
SILT												30	20	30	30		10	10	20	50	20	10	10	10	10				110	110	50

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																5				10									15	
BOULDERS										20																20				
COBBLE				20		20		20	20				10			20										20	60	10	20	
DETRITUS	20	20	20	20	20	30	20	20	20	20	30	30	30	30	30	20	15	20	30	30	50	50	50	50	50	100	110	150	115	250
LEAVES	10	10	10	5	10	5	5	10	10	20	10	10		10	15	5	10	5	5	5	10	10	10	10	10	45	50	45	30	50
LOGS	10	10	15	20	10					20	20					10		10	10							65	40	10	20	
MACROPHYTES	10				10	20	20	10			30	20	10	20	20	20	20	20	20						20	50	100	80		
PERIPHYTON		10	20						10									15	10	10						30	10		35	
PINE NEEDLES	5	10	20	5	20	5	5								10	5	5	5	5						60	10	10	20		

HAMER LAKE 30-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
QUADRAT FLOOR																														
BEDROCK											40	40	50	20	30	30												180	30	
BOULDERS						20																					20			
CLAY																														
COBBLE																														
GRAVEL																														
LOGS	20			20		10	5	20	25		5	10		5		10	10	10	10		5		20	5	10	40	60	20	40	40
MACROPHYTES	30	20	40	25	30	20	30	10	20	20	10		10	10	25	20	40	35	40	25	25	20	20	25	40	145	100	55	160	130
MISCELLANEOUS																														
SAND	10	10	10	10	10	10	10	10	10	5	10	20	15	25	15	10	15	10	20	20	5	10	10	10	5	50	45	85	75	40
SILT	40	60	50	45	60	70	50	55	50	50	35	30	25	40	30	40	35	45	30	45	65	70	50	60	45	255	275	160	195	290

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	15	10	20	20	15	5	5	10	5	10	15	10	10	10	10	10	15	5	10	10						80	35	55	50	
BOULDERS						10																				10				
COBBLE																														
DETRITUS	40	30	30	40	50	60	50	40	40	40	50	30	40	30		35	40	40	40	40	60	50	55	50	40	190	230	150	195	255
LEAVES	15	5	10	5	10	20	10	10	15	10			20	10	20	15	10	10	20	10	30	25	20	20	20	45	65	50	65	115
LOGS	10			10		20	10	10	20		10	15		10		20	15	20	20		10		30	15	15	20	60	35	75	70
MACROPHYTES	15	20	30	20	25	30	25	20	10	10	20		20	20	30	25	30	40	30	20	30	25	30	40	30	110	95	90	145	155
PERIPHYTON	10	10	10	10	10	20	10	10	5	10	10	10	10	15	10	10	10	10	10	15	20	10	15	10	10	50	55	55	55	65
PINE NEEDLES		5		5	5	20	10	15	10	20			10		10	5					5	10	10	15	5	15	75	20	5	45

A2-25

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>WATER COLUMN</u>																										
ALGAE						20							10	5		10						20		25		
BOULDERS			20	10		20		20			20			20	20		15	25	25		50	30	40	60	15	100
COBBLE	5									10				10	10			20	50	25	20	5	10	20	5	190
DETRITUS	5	15		20		20	15	10	10	5	15	5	10	5		10	10	5	5	5	5	40	60	35	35	20
LEAVES	5				5	20	20	10	10			10						5	5	5		10	60	10	5	15
LOGS	5	10			20				10		10					10	20				10					
MACROPHYTES	90	90	60	70	40	70	40	60	20	20	5		20	20	10	40				20		350	210	55	60	5
PERIPHYTON	90	90	100	100	100	90	90	100	80	100	90		100	100	100	80	10	80	90	75	90	100	100	100	100	
PINE NEEDLES																						480	460	390	335	490

HARP LAKE 11-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
QUADRAT FLOOR																														
BEDROCK									45																	45				
BOULDERS						30	10	40		40	20										15					120	20		15	
CLAY																														
COBBLE	30			5	5	30	40	10	10	10	15	10	15	10	15			5	5	5	10	10	5	5	10	40	100	65	15	40
GRAVEL	15	15		5	5		5				5	5	5	5				5			5	5	5	5	5	40	5	20	5	25
LOGS		5	5	5							5								10		5		10	5		15		5	10	20
MACROPHYTES						10	20	10	5	5		10		5		40	40	30	15	30	5	10	5	10	5		50	15	155	35
MISCELLANEOUS																														
SAND	30	45	65	55	60	10	10	15	20	20	50	40	45	55	55	20	20	25	25	20	50	65	50	60	45	255	75	245	110	270
SILT	25	35	30	30	30	20	15	25	20	25	30	20	25	30	25	40	40	35	45	45	25	10	25	15	20	150	105	130	205	95

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE				5	10							5		5		60	30	20	20	20	5	10	10	15	5	15		10	150	45
BOULDERS				10	5	15	10	40		40	20	25														15	105	45		
COBBLE	55			10		10		10	10		15		10		5								5		10	65	30	30		15
DETRITUS	5	15		5	5	5	5	5		5	5			10		10	5	5	60	10	50	5	20	5	5	30	20	20	90	85
LEAVES	20	15	25	20	15	5	5	5		5	5	5	10	5		10	10	5	10	5	5	5	5	5	5	95	20	30	40	25
LOGS	5	5	5								20	10		15					15		10		30		15	15		45	15	55
MACROPHYTES				5		25	40	15	5	5		20		10		95	100	60	30	75	10	25	10	25	10	5	90	30	360	80
PERIPHYTON		20	60	70	40	100	60	85	70	100	80	75	60	40	60	20	30	40	30	60	40	40	40	20	80	190	415	315	180	220
PINE NEEDLES	10		5															5								15			5	

HENEY LAKE 31-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK						20		65																		85				
BOULDERS						15		10								15					40	30	30		10	25		15	110	
CLAY																														
COBBLE		15														10	10		10				10	5	10	15		30	25	
GRAVEL	5	5	20	20	5											10										55		10		
LOGS							25		10	10	25	25	25	25	30	10	10		10	10						45	130	40		
MACROPHYTES	30	15	20	40	35	5		5	15	15			5	15	5	35	10	20	30	30	30	30	25	30	30	140	40	25	125	145
MISCELLANEOUS	5					10	10		10	10	15	20	20	10	5	10		10	10	5						5	40	70	35	
SAND	40	50	50	30	40						10	5	5		5	40	5		35		5	5	5	5	5	210		25	80	25
SILT	20	15	10	10	20	50	65	20	65	65	50	50	45	50	55	45	20	40	50	10	25	35	30	60	45	75	265	250	165	195

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	10	30	20	15	50	40	40	15	50	10	5	15	15	10	10	20	30	25	15	40	10	5		5	30	125	155	55	130	50
BOULDERS						20		20										15					10				40		15	10
COBBLE								10								5		10									10		15	
DETRITUS	5	15	10	10		10	15	10	30	10	20	20	25	10	15	15	15	15	5			10	5	10	10	40	75	90	65	35
LEAVES	5	10	10	5	5	10	5	20	10	5	5	30	40	5	5	5	5	5	5	5	5	10	5	10	5	35	50	85	25	35
LOGS	10	20	5	5		10	25		10	15	15	20		15	25	10	20	25		10	10	20				40	60	75	65	30
MACROPHYTES	80	45	70	90	100	5		5	30	20			15	30	5	80	20	40	65	60	70	60	55	70	60	385	60	50	265	315
PERIPHYTON	60	50	30	30	50	50	50	80	20	40	60	50	40	60	60	40	60	40	40	20	40	40	60	50	30	220	240	270	200	220
PINE NEEDLES						5	5	15	5		10	5	10	5	5	5		5	5	5	5	5					30	35	20	10

KAWAGAMA LAKE 01-NOV-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																				30								30		
BOULDERS			10		10						15			50	20	20		15		10				10	10	20		85	45	20
CLAY																														
COBBLE	20	20	10	5	10	40	30	45	25	50	40	60	20	20	50	10	20	15	20	15				10	35	65	190	190	80	45
GRAVEL	40	30	5	20	5	40	25	30	20	20	10	20	55	15	10	25	5	10	15	10				15	25	100	135	110	65	40
LOGS										30					20		10				10						30	20	10	10
MACROPHYTES																	10					5							10	5
MISCELLANEOUS																														
SAND	30	40	65	65	65	15	20	20	10	25	25	10	15	10		25	35	35	45	25	55	60	65	45	15	265	90	60	165	240
SILT	10	10	10	10	10	5	25	5	5	5	10	10	10	5		20	20	25	20	10	35	35	35	20	15	50	45	35	95	140

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS			10		10						10	10		30	10	10		10		15				5	10	20		60	35	15
COBBLE	15	15		5	5	30	25	20	30	20	20	30	10	10	20	5	15	10	10	10				5	15	40	125	90	50	20
DETRITUS	20	5	5	15	15	5	10		10	10	25	10	10	5	10	10	10	20	5	15	10	5	5	15	10	60	35	60	60	45
LEAVES	30	5		25	10						30	10	5	5	40	5	15	25	10	10	5	5	5	5		70		90	65	20
LOGS	40	25	55	10	25					25					10	5	20	45	5	5	15			10	5	155	25	10	80	30
MACROPHYTES																	25					15							25	15
PERIPHYTON	50	30	60	20	40	50	70	40	65	50	30	50	40	40	30	60	50	40	25	75	60	80	80	75	80	200	275	190	250	375
PINE NEEDLES	10	5	10	20	5						20	5	5		20	5	5	10	5	5		5	5	5	5	50		50	30	20

KOSHLONG LAKE 25-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
QUADRAT FLOOR																														
BEDROCK										90																		90		
BOULDERS	15			5			10																			20	10			
CLAY																														
COBBLE			5	10			5									15					5					15	5		15	5
GRAVEL				5	15						10	10	5	5	5	15	5	15	20	5	10	30	25	15	30	20		35	60	110
LOGS										5																	5			
MACROPHYTES	5	20	25	5	30	40	30	40		35									10							85	145		10	
MISCELLANEOUS	10	5	10	5	5	5	5	5		5																35	20			
SAND			5	5	5						85	85	90	90	85	65	90	80	60	90	80	60	70	60	60	15		435	385	330
SILT	70	75	55	65	45	55	50	55	10	60	5	5	5	5	10	5	5	5	10	5	10	5	5	25	10	310	230	30	30	55

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE	5	15				20	25	25		20									15							20	90		15	
BOULDERS				5	5		10																40			10	10			40
COBBLE			5	5	10				30									5							20	30			5	
DETRITUS	5	15	15	65	20	5		5	15	10	45	65	10	30	80	5	85	75	40	60	5		5		120	35	230	265	10	
LEAVES	10	5	5	5	5	5	5	5	5	5	25		5	10	20		5	5	5	5					30	25	60	20		
LOGS			5				5			10	5		5	5												5	15	15		
MACROPHYTES	10	40	55	10	60	100	70	100		90									30							175	360		30	
PERIPHYTON	90	90	95	90	100	75	60	75	90	90	20	15	10	60	20	60			20		90	85	100	20	90	465	390	125	80	385
PINE NEEDLES	5		5	5								5		5	5		25	25	15	5						15		15	70	

LEONARD LAKE 25-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
QUADRAT FLOOR																														
BEDROCK	15	10		30	20											5	5	45	10		10	40	5	30	75			65	85	
BOULDERS		20	20	30											40										70		40			
CLAY											30	20	20	10	5	25	10	20	10	30	30	20	15	20	20			85	95	105
COBBLE					20						5				5		40		30					20	20	20		10	70	20
GRAVEL														20	10	15	20		20	20	10	5	5					30	75	20
LOGS	5		10	5	10	5		20		20	10	10	10	5												30	45	35		
MACROPHYTES	10	20				10			5		35	10	10			5			10							30	15	55	15	
MISCELLANEOUS																														
SAND	40	30	40	25	30	5	20	10	10	20	40	20	40	30	30		5				20	15	10	20		165	65	160	5	65
SILT	30	20	30	10	20	80	80	70	85	60	15	15	20	25	10	50	20	35	30	40	40	50	30	55	30	110	375	85	175	205

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE																														
BOULDERS		15		20										30		40		20						10	35		30	60	10	
COBBLE					10						10			10		10	20		15	15	20	10	10		10		20	60	40	
DETRITUS	25	15	30	20	35	60	60	70	70	60	15	15	10	5	10	15	10	20	15	10	15	20	20	25	5	125	320	55	70	85
LEAVES	20	15	30	20	20	25	30	20	10	20	20	10	10		20	20	10	15		5	10	20	15	25	20	105	105	60	50	90
LOGS	10	20	10	15	25	10		25		30	20	20	15	10		10	5		20		10					80	65	65	35	10
MACROPHYTES	20	20				20			20		20	5	20			10	5	30	15			15	30	10	20	40	40	45	60	75
PERIPHYTON	5	5	5	5	5						15	5	5	10		5	15	10	15	10	5	5	10	5	15	25		35	55	40
PINE NEEDLES	15	10	10		10	10	10	5	10	10	10	5	5		10	10	5	10		5	10	10	10	15	10	45	45	30	30	55

LOHI LAKE 05-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK														40													40			
BOULDERS																														
CLAY	40	70	50	40	65						40	30		40							40	45	55	50	10	265		110		200
COBBLE			10			10	5		5		20		10	10		30	10	20	50	20	20	15	20	20	30	10	20	40	130	105
GRAVEL						5	5	5	5	5	20	10		15		30	40	20	30	30	10	20	5	5	30		25	45	150	70
LOGS				5		5		10		10			10					5									5	25	10	5
MACROPHYTES	20	5	10	25	5	5			15	5	10	5	5	15						10							65	25	35	10
MISCELLANEOUS																														
SAND	10	5	5		10	10	5	5	5	5	50	10	5	30	10	30	30	30	15	30	20	10	15	20	20	30	30	105	135	85
SILT	30	20	25	30	20	65	85	80	70	75	10	30	40		35	10	20	25	5	10	10	10	5	5	10	125	375	115	70	40

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE			10	5	5	5			5	5	5		5	5	5	5											20	15	15	5
BOULDERS											5																	5		
COBBLE			5			10				10	20			10		15	20	30	50	5	20	15	25	30	30	5	20	30	120	120
DETRITUS	30	10	5	10	5	60	60	40	30						5	5	20	50	5	15		5	50	5		60	190	5	95	60
LEAVES						5																								
LOGS			5	10		20	25	30	25	20			20		5	5	25		10		5		5	5		15	120	25	40	15
MACROPHYTES	90	10	20	65	5	5		10	30	5	25	10	10	30		30			10							190	50	75	40	
PERIPHYTON	100	80	90	95	90	70	40	75	70	90	85	90	80	70	90	75	60	70	60	60	60	90	70	75	60	455	345	415	325	355
PINE NEEDLES																														

LOUISA LAKE 24-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK														25													25			
BOULDERS												10															10			
CLAY																														
COBBLE						40	30	10			35	25	10	40							10				5		80	110		15
GRAVEL						15	20	15	15	15	15	15	20	15	15									5			80	80		5
LOGS			5													10	10	10	5	15		5		5		5			50	10
MACROPHYTES			40	20	15	5		30								15		15	20	15	5	10	30			75	35		65	45
MISCELLANEOUS											5					10	20	10	10	10	15	5	10	15	10			5	60	55
SAND	90	90	25	60	70	35	40	35	75	60	35	35	45	15	60	5														
SILT	10	10	30	20	15	5	10	10	10	25	10	15	25	5	25	60	70	65	65	60	80	80	50	80	80	85	60	80	320	370

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE			20	10	10	5	5	15			5			20	10	25		30	30	20		20	30	10	5	40	25	35	105	65
BOULDERS													15	25														40		
COBBLE						30	15	10			15	10		20								5		5			55	45		10
DETRITUS		5		10	10				15	40	5	10	25	15	15	45	40	20	10	15	15	15	10	20	40	25	55	70	130	100
LEAVES							5						5	5	5	5		5						5			5	15	10	5
LOGS		15		5	10				40	10		10			15	5	15	15	10	15	5	5	5	15		30	50	25	60	30
MACROPHYTES			100	45	25	5		60								30		30	45	25	5	20	70			170	65		130	95
PERIPHYTON	20	30	20	20	20	30	35	30	40	30	50	50	20	45	20	80	40	50	50	30				40	25	110	165	185	250	65
PINE NEEDLES	5			5	5									5	5											15		10		

MEACH LAKE 23-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS	10	30	10	25		25		30																		75	55			
CLAY																														
COBBLE	20	10	15	10	10	5	5	5	5							10	10									65	20		20	
GRAVEL	5	5	5	5	15											15	20	10	5							35			50	
LOGS							10		10	20	15	20	10					10	5		10	5	20	10			40	45	15	45
MACROPHYTES	20	15	10	5	15		5	10	5	5	10	5	25	10	30	40	30	10	30	10	30	15	10		30	65	25	80	120	85
MISCELLANEOUS																														
SAND	20	15	20	10	45	5	5	5	5	5	20	25	25	30	20	20	15	20	20	30	20	30	40	50	50	110	25	120	105	190
SILT	25	25	40	45	15	60	75	50	75	70	55	50	40	60	50	40	30	40	30	50	40	50	30	40	20	150	330	255	190	180

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS		20	30	20			25																			70	25			
COBBLE	10		5	5																						20				
DETRITUS	20	10	15	15	10	25	20	25	20	25	15	10	10	10	20	25	20	10	20	25	20	15	10	10	10	70	115	65	100	65
LEAVES					15	50	5	10	15	5	10	10	10	5	5	15		15	15	20	10	10	5	25	10	15	85	40	65	60
LOGS	5	5			10	10	10	10	35	30	30	25	20	5	5	5	20	10	5	5	20	5	20	10	5	20	95	85	45	60
MACROPHYTES	40	30	25	10	35		10	20	15	15	15	5	30	20	20	30	15	10	30	5	15	15	10		20	140	60	90	90	60
PERIPHYTON	5	10	15	10	5	20	10	20	15	20	5	5	10	5	5	10	15	10	10	5	5	5		15		45	85	30	50	30
PINE NEEDLES																														

MIDDLE LAKE 04-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
QUADRAT FLOOR																															
BEDROCK								50		40	30																90	30			
BOULDERS						10					10						10		10		30		30		50		10	10	20	110	
CLAY	5		30	10		5																					45	5			
COBBLE		10			10	10		20	20	10	30	40	50	40	40	60	60	20	20	20	40	20	40		20	20	60	200	180	120	
GRAVEL	10	10	10	10	15	25	15	5	10	5		10	5	25	20	10	5	40	20	20		5	15	5	5	55	60	60	95	30	
LOGS					5												10	5		10						5			25		
MACROPHYTES	5	5		20	5	15	5	5	5	5				5	5				5			5		5	5	35	35	10	5	15	
MISCELLANEOUS	5	5																									10				
SAND	40	30	40	30	40	20	20	10	15	15	20	10	15	15	15	10	5	10	25	30	10	30		40	5	180	80	75	80	85	
SILT	35	40	20	30	25	25	50	10	50	25	20	30	30	15	20	20	20	15	30	10	10	40	15	50	15	150	160	115	95	130	

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE									20	5																	25			
BOULDERS											30								10		30		30		50			30	10	110
COBBLE					15	10		10		5	20	20		5		20	15	10	10	10	20	5	30		10	15	25	45	65	65
DETRITUS	10	5	5	10	5	10	20	10	5	5	5	5	5		5	5	10		10	20				5		35	50	20	45	5
LEAVES							10		10	10	5	5		5	5												30	20		
LOGS	10	20	5	5	5		10		5		5	15	25		10	20	25	25	20	60	20	5		30		45	15	55	150	55
MACROPHYTES	5	5	5	30	5	70	25	5	20	5		5		10	5	5		30			10		10	5		50	125	20	35	25
PERIPHYTON	100	100	90	100	100	70	100	100	90	100	100	100	100	100	95	100	100	90	100	90	100	100	95	100	100	490	460	495	480	495
PINE NEEDLES																														

MOOT LAKE 03-NOV-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK	60	10	20																			30				90				30
BOULDERS					10	30	15	10	30		30										20		15	40		10	85	30		75
CLAY																														
COBBLE	10	10	50	20	30	10	20	30		10	10					15	10	10	15	15		20	30	20	20	120	70	10	65	90
GRAVEL	10	10	5	10			10	5	5	30	10	10				5	10	10	15	5	10		5			35	50	20	45	15
LOGS											5									5								5	5	
MACROPHYTES		20		20	30	35		30	10		5					10					35	25	10	10		70	75	5	10	80
MISCELLANEOUS											5	5	5	10			5	10	10		5		5				25	25	10	
SAND	10	15	10	15	10	5	20	15	25	30	40	60	70	65	50	60	60	50	50	60	20	10	20	10	15	60	95	285	280	75
SILT	10	35	15	35	20	20	35	10	30	30	5	20	25	30	35	10	15	20	10	15	30	25	40	15	25	115	125	115	70	135

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE					10	15	10	10								10					20	20		10	10	10	35		10	60
BOULDERS	15				10		15				30										10			30		25	15	30		40
COBBLE			20	5		10				5						5								10		25	15		5	10
DETRITUS		10	5	15	20	5	20	10	10	10	10	10	5	10	15	10	10	10	25	10	5	10	10	10	10	50	55	50	65	45
LEAVES	5					5	40	5	5	5			10	5	5	10	70	5	5	40				60	35	5	60	20	130	95
LOGS						5		5	10	5		5	5			15		15	10	5	5		5				25	10	45	10
MACROPHYTES		40		40	60	70		70	20	5	10					15					75	60	30	20		140	165	10	15	185
PERIPHYTON	60	40	50	30			20																	10		180	20			10
PINE NEEDLES								5	5	5							5	5	5	5							15		20	

MOUSE LAKE 26-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
QUADRAT FLOOR																														
BEDROCK																15												15		
BOULDERS		5			5	10	5	10	20	30						15	15	5	5	10			10	10	5	10	75		50	25
CLAY																														
COBBLE								15	15	10											25	10			5	40			40	
GRAVEL								5	5												10				5	10			15	
LOGS	30	15	30	15	25	15	15	10	10	5	20	30	15	10	20	10	10	15	20	15	10	25	25	20	15	115	55	95	70	95
MACROPHYTES	10		5	10	5	15	10	10	10	10	15	10	10	10	10	5	10	10	10	10	10	10	10	10	10	30	55	55	45	50
MISCELLANEOUS																														
SAND		10		10		45	20	40	35	35	65	45	65	70	50	30	15	5	5	20	40	40	15	35	40	20	175	295	75	170
SILT	60	70	65	65	65	15	50	10	5	10		15	10	10	20	40	50	50	60	45	5	15	40	15	20	325	90	55	245	95

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS						10				15						15	5									25		20		
COBBLE																					10								10	
DETRITUS	40	60	60	45	65	40	60	30	40		20	40	60	30	40	25	40	30	30	35	20	30	30	20	30	270	170	190	160	130
LEAVES	5	5	10	10	10	5	10	10	5	15	15	5	20	10	10	5	10	20	15	15	15	10	5	5	5	40	45	60	65	40
LOGS	35	5	20	10	5		10	10			10	20	5	5	20	10		10	10		5	10	15	15	20	75	20	60	30	65
MACROPHYTES	20		5	15	15	35	15	35	20	40	40	10	10	30	30	30	30	35	25		20	45	30	20	10	55	145	120	150	125
PERIPHYTON						10	10	15	10	10	15			10	5	10	5	10	10	5		10			5		55	30	40	15
PINE NEEDLES	5	5	5	5	5	5	5		5	10	10	5	5	5	5	5	5	10	5	5	10	5	5	5	5	25	25	30	30	30

PEARCELEY LAKE 10-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
QUADRAT FLOOR																															
BEDROCK										70			60	40	50												70	150			
BOULDERS	90	50	45	30	60						40	25		25		45	50		30		20	15	25	10	20	275		90	125	90	
CLAY																															
COBBLE		15	5	10	15				15	5	20								15		30	45	5	20	20	45	20	20	15	120	
GRAVEL		5	20	5	5	5	5	5	5						10	5	5		10		25	10	5	5	5	35	20	10	20	50	
LOGS						5					10	15	5			5											5	30	5		
MACROPHYTES						10	5	5			5	15	10					5	30	5							20	30	40		
MISCELLANEOUS																															
SAND	5	20	20	15	10	65	75	60	80	15	5	20	10	15	10	60	25	30	10	20	20	25	10	10	10	70	295	60	145	75	
SILT	5	10	10	40	10	15	15	15	10	15	20	25	15	20	30	40	20	10	60	20	5	5	50	40	30	75	70	110	150	130	

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	5	5	10	5	10	5	5	5		10						25	20	10	5		15	30		15	5	35	25		60	65
BOULDERS	45	15	15	15	30						10					30	30				15	10	20		20	120		10	60	65
COBBLE		10	5		10			5	5		15			15					5		10	20				25	10	30	5	30
DETRITUS	10	10	10	15	15	15	5	5	5	5	20	20	20	10	10	10	20	5	5	15	5	5	25	20	15	60	35	80	55	70
LEAVES	5	15	5	5	10	5	5	5				20	15	10	20	10	25	15	5	10	5	5	5	5	25	40	15	65	65	45
LOGS	5	15	5	20	10	20		10			20	25	10	20	15	5		10	10		10	15	20	20	15	55	30	90	25	80
MACROPHYTES						15	10	5			10		5			5	5	70	5						5		30	15	85	5
PERIPHYTON	30	10	10	10	25						30	25	10	15	10	10	20	30	20	10	50	30	20	20	15	85		90	90	135
PINE NEEDLES																														

PINCHER LAKE 27-OCT-93

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>QUADRAT FLOOR</u>																															
BEDROCK									80		10				10												80	20			
BOULDERS					20	10	10	30	5	15	30	25	20	15	20		5			10	5	15	10	10	15	20	70	110	15	55	
CLAY																															
COBBLE	10		10			40	15			15	20		5		10						15			5		20	70	35		20	
GRAVEL						10		5					15								5			5		15	15		10		
LOGS	5	10	10	10	10	5	20	10	5	10	5	10	5	5		10	15	20	20	10	10	10	15	15	45	50	25	75	60		
MACROPHYTES					5					5	5	5	5	5					5	5			10		5	5	20	10	10		
MISCELLANEOUS																															
SAND	55	80	70	80	35	35	55	55	10	30		10	10	10	25						85	55	80	65	60	320	185	55		345	
SILT	30	10	10	10	30					25	30	50	30	65	35	90	80	80	75	75						90	25	210	400		

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE											5		30	80	20				10									135	10	
BOULDERS					20	10	10	30	40	10	20	20	20	5	40						10			20	20	100	105		30	
COBBLE	10		10			25	15			15										5				20	55			5		
DETRITUS	20	20		40	60	10	60	30	10	50	45	50		15	15	85	80	85	75	70	80	50	70	60	55	140	160	125	395	315
LEAVES	50	40	10	5	5	5	10	15	5	10	10	15	5	5	10	10	5	10	5	10	5		15	15	5	110	45	45	40	40
LOGS	10	5	10	20	10	10	20	20	10	10	10	15	5		5	10	15	20	15	10	20	10	10	15	25	55	70	35	70	80
MACROPHYTES			5		5						10		10	10	10				10	5				10		10		40	15	10
PERIPHYTON									30																		30			
PINE NEEDLES	10	10	10	5				5	5	5						5	5		5		5		5			35	15		15	10

PLASTIC LAKE 02-NOV-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK			10			40	75	25	30	55					30											10	225	30		
BOULDERS	10		10	10	15											30	35	50	15	30	15	25	30	25	20	45			160	115
CLAY																														
COBBLE						10							10			10	15	10		20							10	10	55	
GRAVEL													10					5		10			5		5			10	15	10
LOGS	5	10	10	10	10	5	5	5	15	15	20	20	10	10	5	10	5	5	15	10	10	10	5	15	5	45	45	65	45	45
MACROPHYTES	15	10		30	10	10	5	10	5	10	10	10	10	10	15	5	10	10	10	10	15	10	10	10	10	65	40	55	45	55
MISCELLANEOUS																														
SAND	30	20	35	35	40	15		15	10		15	20	20	40	30	40	30	20	40	20	40	40	40	50	50	160	40	125	150	220
SILT	40	60	35	15	25	20	15	45	40	20	55	50	60	20	20	5	5		20		10	15	10		10	175	140	205	30	45

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS				5												20	15	35	5	20	10	10	10		10	5			95	40
COBBLE													5															5		
DETRITUS	30	50	60	50	40	70	70	35	50	50	30	40	40	25	40	40	40	15	35	30	45	40	35	30	40	230	275	175	160	190
LEAVES	10	5	5	10	20	5					15	20	20	10	15	5	5	5	5	10	10	5	15	15	15	50	5	80	30	60
LOGS	10	10	20	10	10	5	10	10	20	20	15	15				5	15	5	20	10	15	5	5	15	15	60	65	30	55	55
MACROPHYTES	45	25	10	50	30	20	10	40	20	15	10	15	15	30	20	20	15	30	30	25	25	30	15	20	30	160	105	90	120	120
PERIPHYTON	10	5	5	10	15	10		10	5	15			10	15	10	10	15	10	15	10	15	10	10	15	15	45	40	35	60	65
PINE NEEDLES				5	10						45	15	20	30	10	5		5		5			5	5	5	15		120	15	15

RANGER LAKE 26-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																5													5	
CLAY																														
COBBLE	15	15	15			10																				45	10			
GRAVEL		10	15	10	10	20	10	20	10						5	15	15	5		20		5	15		10	45	60	5	55	30
LOGS	10	20	10	10	10	15	5	10	5	10	5	5	5	10	10	5	10	15	10		10	10	10	10	5	60	45	35	40	45
MACROPHYTES	5		5	5	10	15	40	10	15	15	10	30	30	20	15	10	15	10	5	5	20	20	5	20	15	25	95	105	45	80
MISCELLANEOUS																														
SAND	60	40	45	45	60	40	45	50	50	65	70	55	45	55	65	45	45	50	65	70	55	50	60	60	60	250	250	290	275	285
SILT	10	15	10	30	10			10	10	10	15	10	20	15	5	10	5	20	20	5	15	15	10	10	10	75	30	65	60	60

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE																														
BOULDERS																														
COBBLE	5		10			5																				15	5			
DETRITUS	40	50		60	50	5	20	10	20	40	15	20	40	40	30	20	15	30	50		70	40	40	30	30	200	95	145	115	210
LEAVES	5	10	10	5	15				5	5	5	10	5	10	5		5	5		30	5	10	5	5	5	45	10	35	40	30
LOGS	20	15	20	10	10	20		10	5	10	5	10	5	10	20	15	10	20	10	5	10	5	20	5	15	75	45	50	60	55
MACROPHYTES	5	5	5	5	10	35	75	20	30	20	40	80	60	40	30	15	25	15	10	10	30	30	10	60	60	30	180	250	75	190
PERIPHYTON																														
PINE NEEDLES															5					5								5	5	

RED CHALK EAST LAKE 07-NOV-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>QUADRAT FLOOR</u>																															
BEDROCK																															
BOULDERS						25	25			15																	65				
CLAY																															
COBBLE	10			15	10	60	55	65	45	60	40	50	10	60	30	40	50	30	30	40	25	35	30	45	40	35	285	190	190	175	
GRAVEL	30				10	10			5		10	10	10	5	5	20	15	25	10	20	5	5			10	40	15	40	90	20	
LOGS		10	15	10	10																						45				
MACROPHYTES		5	5			20	10		15	10						5				5	5	20	10	10	10	10	10	55		10	55
MISCELLANEOUS		10	15	20								10		15													45		25		
SAND	40	10	5	10	20	5			30		40	30	30	25	20	25	30	35	40	35	5	5	5	5	5	85	35	145	165	25	
SILT	20	65	60	45	50	5	10	10	5	15	10	10	40	10	30	10	5	10	20		60	35	55	40	35	240	45	100	45	225	

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE		5						5																			5	5		
BOULDERS								25	50	10	25																110			
COBBLE						5	20	15	40	30	10			10	5	5	10			5	10	10	10	10	5		110	25	20	45
DETRITUS	40	40	70	80	65	5	5		5		15	15	10	10	10	15	10	20		5	5	5		10	10	295	15	60	50	30
LEAVES	20	5	45	10	15	5			10		60	65	70	5	40	65	10	25	60	40	5	5	55	5	5	95	15	240	200	75
LOGS	20	20		10	30	5			5	5	5	10	5		10				15	15	10	5				80	15	30	30	15
MACROPHYTES		10	5			80	30		40	15						15				5	15	50	35	20	15	15	165		20	135
PERIPHYTON	20	30	15		30	80	90	90	40	80		10		10				10	15	15	20	15	10	15		95	380	20	40	60
PINE NEEDLES	5	5	5	15	5	5	5				5			5	5					5						35	10	15	5	

RED CHALK MAIN LAKE 07-NOV-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK								20																			20			
BOULDERS								35	25																		60			
CLAY																														
COBBLE	30				25											40	30	55	80	55		5	5	5		55			260	15
GRAVEL	10		20	10	15	10	10		10					5		5	10	5	5	5	20	25	20	25	20	55	30	5	30	110
LOGS						10				10	15	25	20	10	15												20	85		
MACROPHYTES		30						5	20	25	15	5				15	5	15			5	5	5		15	30	65	5	35	30
MISCELLANEOUS			15	10		10				10	15	10	10	15	15												25	20	65	
SAND	50	50	40	45	50	40	70	5	30	35	5	30	40	25	25	35	45	20	10	30	65	55	60	60	55	235	180	125	140	295
SILT	10	20	25	35	10	30	15	20	10	30	60	35	30	45	45	5	10	5	5	10	10	10	10	10	10	100	105	215	35	50

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE											5	5		5														15		
BOULDERS								20																			20			
COBBLE	25				5											30	15	25	50	20		5	5	10		30			140	20
DETRITUS			25	20	5	50	60		30	40	20	50	30	60	50	10	5	35	5	10	10	5	10	10	10	50	180	210	65	45
LEAVES	25	30	10	10	20	10	10	60		40	5	5	50	5	50		5		5					5		95	120	115	10	10
LOGS	5	5	15	30	5	30	30		10	20	35	25	40	30	30		5	10		10	5	5	10	15	10	60	90	160	25	45
MACROPHYTES		70			5	20	15	50	70	30	5					30	25				10	10	5	40	40	75	185	5	55	105
PERIPHYTON						40	70	20	60	40	30	40	40		30					10							230	140	10	
PINE NEEDLES										5																	5			

RIDOUT LAKE 19-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK											15					15											15	15		
BOULDERS					40			30	25		15					10				20						40	55	15	30	
CLAY																														
COBBLE	5	15		10	25		25	15	15	15	40	20	20	25	25	5	20	15	20	25						55	70	130	85	
GRAVEL	15	15	10	15	10	10	10	5	5	5	15	10	5	15	5	5	5	15	5	5	5	5				65	35	50	35	5
LOGS						10															10			5		10			15	
MACROPHYTES	15	5	15			30	5	15	15	10	5	10	15	15	25	25	10	5		5	30	35	5	15	35	35	75	70	45	120
MISCELLANEOUS			5	5						5								5					15	5		10	5		5	20
SAND	60	55	50	45	20	40	50	30	30	50	30	40	40	25	25	30	35	45	65	30	50	20	10	60	5	230	200	160	205	145
SILT	5	10	20	25	5	10	10	5	10	15	10	20	5	5	20	20	20	15	10	15	15	35	70	25	50	65	50	60	80	195

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	5	5	5			5					20		5			5		5	5	20				5		15	5	25	35	5
BOULDERS		15			40			30	25				15	10		15		5	15	25						55	55	25	60	
COBBLE	5				15	5		15			15	5	15	10	10	5	10		5							20	20	55	20	
DETRITUS	10	30	25	10	15	5	25	5	5	30	5	5	10		5	15	10	20	20	20		10	15	10		90	70	25	85	35
LEAVES	5	20	5			5	5	5	5	5			5	5		5	5	10	10	10	5	10	10	5	25	30	25	10	40	55
LOGS	10	10	15	40	5	15	5			20	50	5				5	35	10	15	10		10	20		5	80	40	55	75	35
MACROPHYTES	30	10	40			65	15	45	40	20	10	25	30	25	50	55	15	10	5	5	60	70	10	30	70	80	185	140	90	240
PERIPHYTON	30	30	25	30	40	30	15		20	20	25	30	25	25	25	15	40	25	10	15			10			155	85	130	105	10
PINE NEEDLES	20	20	10				5			5																50	10			

SCUGOG LAKE 12-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS										20																	20			
CLAY																														
COBBLE	15					5				20	45										60	15					15	70		75
GRAVEL	5		5			10	15	10	10	20				10							20	25					10	65	10	45
LOGS							5	5									20						5				10		20	5
MACROPHYTES	5	10	10	10	15	5	5	5	5							50	50	40	50	50				10	5	50	20		240	15
MISCELLANEOUS																														
SAND	40	40	40	30	40	50	40	40	40	10	90	80	80	80	80						15	35	60	45	50	190	180	410		205
SILT	45	50	45	60	45	30	35	30	25	5	10	20	20	20	10	50	50	40	50	50	5	25	35	45	45	245	125	80	240	155

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>WATER COLUMN</u>																															
ALGAE	10	5	5	5	5																50						30			50	
BOULDERS										20																	20				
COBBLE	15								10	15	60										10					15	85			10	
DETRITUS						5	5	5	5	5	5	5			5	10	10		10	10	5						25	10	40	5	
LEAVES																10	5			5	5								20	5	
LOGS							5	5									20	10	20								10		50		
MACROPHYTES	10	20	20	20	30	5	10	5	5							100	100	100	100	100				20	5	100	25		500	25	
PERIPHYTON	10	10	10	10	10					30	5				5						25						50	30	10		25
PINE NEEDLES																															

SHERBORNE LAKE 17-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>QUADRAT FLOOR</u>																															
BEDROCK																															
BOULDERS											20	10								30								30	30		
CLAY	30	30	30	30	30																										
COBBLE											20			30	30	35	30	20	20		10	20		10	20			80	105	60	
GRAVEL						20		5	20																			45			
LOGS						10	30	20	20	20	20		20	20	20	10	5	20	20	40	20		20	20		10		100	70	105	50
MACROPHYTES	40	40	40	40	40			5			5		10	10	20	20	10	10		5	20	10	10	20	10		200	5	45	45	70
MISCELLANEOUS																															
SAND						30	30	55	40	60		20	30					20										215	50	20	
SILT	30	30	30	30	30	40	40	15	20	20	55	50	40	40	40	40	40	30	40	45	70	50	70	70	60		150	135	225	195	320

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	10	10	10	10	10									30													50		30	
BOULDERS																														
COBBLE																10			10										20	
DETRITUS	10	10	10	10	10	30	30	25	25	20	30	20	30	30			40	30	20	20	25	40	30		40	50	130	110	110	135
LEAVES						20	5	5	5	20	20	10	5	20	10	5	10	20	30	20	20	10	10	10	10		55	65	85	60
LOGS	10	10	10	10	10	30	40	40	30	30	20	20	20	20	20	20	10	20	30	30		10	10			50	170	100	110	20
MACROPHYTES	10	10	10	10	10			10			10	40	10		30	30	5	20			30	20	20	50	20	50	10	90	55	140
PERIPHYTON																			20										20	
PINE NEEDLES						10			5	5	10	10	5										10				20	25		10

SKIDWAY LAKE 03-NOV-93

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>QUADRAT FLOOR</u>																															
BEDROCK	50	60		40	20	100	100	100	100	60																170	460				
BOULDERS			10		30																					40					
CLAY																															
COBBLE			30	10															30							40		30			
GRAVEL										20	50	50	50	50	60	30	40	20	20	20				10		20	260	130	10		
LOGS	10																									10					
MACROPHYTES																															
MISCELLANEOUS																															
SAND	40	40	60	50	50					20	50	50	50	50	40	70	60	80	50	80		80	80	100	80	90	240	20	240	340	430
SILT																					20	20		20						60	

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	10	5																								15				
BOULDERS									50	10		10														60	10			
COBBLE											10															10				
DETRITUS			15	5	50	10	20			25	10	80	70	10	80	80	70	60	50	20	5	50	50	95	60	70	55	250	280	260
LEAVES						90		10	10		70	10			15											110	95			
LOGS					10		50	10		5	10			20	5		20				5	35	20	5	20	10	65	35	20	85
MACROPHYTES		5								5																5	5			
PERIPHYTON																														
PINE NEEDLES																														

SMOKE LAKE 22-NOV-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS			10		20																40	25	10	30	20	30				125
CLAY																														
COBBLE	80	5		20												30	10	60	50	10	10		25	25	25	105			160	85
GRAVEL	10	10	5	15	10	10	15	10	10	5	5	5	5	5	5	15	10	10	10	25		25	5	5		50	50	25	70	35
LOGS			10					15	20	20	25	15	15	10	20											10	55	85		
MACROPHYTES		40	30	20	30		15			10									5	5						120	25		10	
MISCELLANEOUS																														
SAND	5	20	25	25	20	60	35	30	30	40	10	10	10	10	10	45	65	20	25	50	30	35	30	30	35	95	195	50	205	160
SILT	5	25	20	20	20	30	35	45	40	25	60	70	70	75	65	10	15	10	10	10	20	15	30	10	20	90	175	340	55	95

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS			10		20																30	15	5	20	15	30				85
COBBLE	60	5		10												15	5	50	25	5	10	10	5	10	10	75			100	45
DETRITUS	5	10	10	10	10	20	15	25	25	30	60	50	70	30	35	5	10	10	5	25	10	5	20	5	10	45	115	245	55	50
LEAVES						60					20	5	10	5	5	5	5		5	10	5	5	15	20	10		60	45	25	55
LOGS	15		15	25	25	30	10	40	35	20	30	40	20	35	50	20	25		10	10	5		10		15	80	135	175	65	30
MACROPHYTES		80	65	40	60		35			20						5			10	10						245	55		25	
PERIPHYTON	60		25	50	40	30	15	40	35	30	30	50	30	50	60	30	25	60	25	30	40	40	30	40	30	175	150	220	170	180
PINE NEEDLES							5	5	5	5						5	5	5		5							20		20	

TIMBERWOLF LAKE 03-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
QUADRAT FLOOR																														
BEDROCK																														
BOULDERS				20																		10	30	50		20				90
CLAY																														
COBBLE	10	10	10		10						10										20	20	20			40		10	60	
GRAVEL																					10	5	15	15					45	
LOGS	5										30	10	10	20	40	5					5					5		110	10	
MACROPHYTES						10	30	30		20						15	20	15	45	10	5	5		5	5		90		105	20
MISCELLANEOUS											10	10	20	10	20													70		
SAND	80	80	80	70	80	60	50	50	70	60						40	40	50	25	40	45	35	40	30	25	390	290		195	175
SILT	5	10	10	10	10	30	20	20	30	20	60	70	70	70	40	40	40	35	30	45	20	35	15	20	20	45	120	310	190	110

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE				5		15	50	30		30	10	5	5	15		10	20	15	40	30	5		5	5		5	125	35	115	15
BOULDERS				20																			10	25	40	20				75
COBBLE	5																				40	20	40	20	15	5			135	
DETRITUS	5	10	5									50	40	40		15	15	25	15	20						20		130	90	
LEAVES	5	5	5		5			5	5	5	5	5				5		5	5	5						20	15	10	20	
LOGS	5	10	50	15	10	5	5	100	5	10	40	40	20	25	30	15	5	5	5	10						90	125	155	40	
MACROPHYTES					5				5	5						30	25	20	90	15	5	10	5	5	5	5	5	10	180	30
PERIPHYTON																10	20	5	5	15									55	
PINE NEEDLES		5	5	5	20	5	15	15		10	75	30	5	5	5												35	45	120	

TWELVE MILE LAKE 28-OCT-94

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS											5								35	20							5	55		
CLAY																														
COBBLE	45	70	65	70	65	60	10	50	70	15	5	15				70	80	40	55	15	30	10	15	40	10	315	205	20	260	105
GRAVEL	25	10	10	15	10	20	5	20	20	5		5	5					10		10	15	20	10	25	15	70	70	10	20	85
LOGS																														
MACROPHYTES						20				15	30		35	45	40	15	10	10		10	15	30	20	10	30		35	150	45	105
MISCELLANEOUS																														
SAND	25	10	20	10	20	15	40	25	5	45	10	70	25	15	10	10	5	30	5	25	30	20	25	25	40	85	130	130	75	140
SILT	5	5	5	5	5	5	25	5	5	20	55	5	35	40	50	5	5	10	5	20	10	20	30		5	25	60	185	45	65

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>WATER COLUMN</u>																															
ALGAE																10	5	25	20										60		
BOULDERS											5								35	15							5	50			
COBBLE	10	30	20	15	20					5						15	10		10	10						95	5		45		
DETRITUS						5				5	10	5	5	5	10	5	10	20	10	5		5	5	5	10		10	35	50	25	
LEAVES			5			5					5	30	10	5	5	5	10	5	5	5	5	5	5	5	5	5	5	5	55	30	25
LOGS											5				10				15									15	15		
MACROPHYTES						40				35	80		70	90	80	40	30	35		30	50	60	50	30	70		75	320	135	260	
PERIPHYTON	90	80	70	90	100	25	40	60	20	65	40	5	30	60	60	90	80	60	75	80	30	30	20	30	20	430	210	195	385	130	
PINE NEEDLES																5													5		

WESTWARD LAKE 19-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK						15	30	35	15	10								10								105		10		
BOULDERS						30	15	15	30	25						15	25	50	15	20				20	30	115		125	50	
CLAY																														
COBBLE						10	5	5	10	10						10	5	30	20	15				10		40		80	10	
GRAVEL							5	5	5	5	5	5	5	5	5	30	25	5	15	20				10		20	25	95	10	
LOGS		5	10	5		10	10	10	10	10	25	25	25	15	15						10	10	5			20	50	105		25
MACROPHYTES	5	15	20		5											5	10		10	15			30	20	10	45		40	60	
MISCELLANEOUS																														
SAND	70	60	60	80	80	5	5	5	10	10	40	35	40	45	35	35	30	10	25	25	40	30	25	20	20	350	35	195	125	135
SILT	25	20	10	15	15	30	30	25	20	30	30	35	30	35	45	5	5	5	5	5	50	60	40	40	20	85	135	175	25	210

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS									10	15						10	20	50	10	10				10		25		100	10	
COBBLE																5			5	5				5				15	5	
DETRITUS	25	15	15	5	10	50	60	55	50	55	30	30	30	70	60	20	10	5	5	10	40	45	30	20	10	70	270	220	50	145
LEAVES	20	10	15	5	5	5	5	5	5	5	60	85	20	75	70	5	5	5	5	5	10	10	10	10	5	55	25	310	25	45
LOGS	10	5	15	10	5	30	40	25	30	30	45	10	25	30	25					5	20	20	10	5	5	45	155	135	5	60
MACROPHYTES	5	20	25		10											15	25		20	30			40	30	20	60		90	90	
PERIPHYTON																5	5	5	5	5			10	10	10				25	30
PINE NEEDLES	10	15	10	5	5	40										10	10	5	5	5	5	20	10	10	5	45	40		35	50

YOUNG LAKE 30-OCT-95

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY																														
COBBLE					5																20	25	10			5			55	
GRAVEL	5	10	10	10	10						5	5	5	5	5						10	5	5	5	5	45		25	30	
LOGS																20	10	25	30	10								95		
MACROPHYTES	10	10		20	30				5							20	15	10	5	5	5		10	10	5	70	5		55	30
MISCELLANEOUS																														
SAND	75	70	80	60	45	75	80	70	70	90	85	85	85	85	85	10	10	10	30	20	40	55	65	65	80	330	385	425	80	305
SILT	10	10	10	10	10	25	20	30	25	10	10	10	10	10	10	50	65	55	35	65	25	15	10	20	10	50	110	50	270	80

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE																														
BOULDERS																														
COBBLE																					5	15							20	
DETRITUS	5	10	40	20	10	30	40	50	40	5	5	20	10	20	10	25	20	15	30	25	15	10	10	10	15	85	165	65	115	60
LEAVES	5	30	60	10	40	5	5	5	5	20	5	5	10	60	5	10	10	10	5	10						145	40	85	45	
LOGS	10	10	20	5	5	5	10	5			10	5		10	10	20	25	25	35	20	5	10	10		5	50	20	35	125	30
MACROPHYTES	20	20		40	60				10							40	30	20	10	15	10		15	20	10	140	10		115	55
PERIPHYTON			10								5	10	5	10	10				25		10	5				10		40	25	15
PINE NEEDLES			10	5	10	5	5	5	5	5		5	5	5	5						5	5	5	5	5	25	25	20		25

VERY LAKE (PLOT 2 POND 18) 23-SEP-96 WETLAND STUDY

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK											80	60		70	60									20				270		20
BOULDERS																														
CLAY																														
COBBLE											10																	10		
GRAVEL																30	20												50	
LOGS	20	10	30	10	10	30	30	20	10			20				10		10		20	10	30	15	20	10	80	90	20	40	85
MACROPHYTES	10	10		20	15	10	30	30	20	40	10		10	20	20	30	30	30	30	20	40	40	25		30	55	130	60	140	135
SAND	30	40	40	30	45				10	20		20	30		10	40	30	30	30	20							185	30	60	150
SILT	40	40	30	40	30	60	40	50	60	40	10	10	40	10	10	20	10	10	40	40	50	30	60	60	60	180	250	80	120	260

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
WATER COLUMN																															
ALGAE						10																					10				
BOULDERS																															
COBBLE											5																	5			
DETRITUS	20	20	20	10		30	20	20	20	20	10	10	10	10	10	15	10	10	20	10	15	10	10	10	15	70	110	50	65	60	
LEAVES	10	10	10	5	5	10	5	10	5	10	5								10		5	5				40	40	5	10	10	
LOGS				5	5	30	20		15			10	10			20	10	10	10		15	20	15	5	10	65	20	50	55		
MACROPHYTES	5	5	5	10	5	10	20	15	15	20	20		10	10	10	20	15		15	15	20	25	20	20	10	30	80	50	65	95	
PERIPHYTON	10	10	5	10	10	30	30	40	40	40	20	15	20	15	20	30	20	40	30	20	40	30	30	40	20	45	180	90	140	160	
PINE NEEDLES		10	10						10					5	5	10							5	10			20	10	10	10	15

DAWSON POND (UPPER) 18-SEP-96 WETLAND STUDY

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																					60									60
BOULDERS																														
CLAY																														
COBBLE			10																								10			
GRAVEL																														
LOGS						10									20												10		20	
MACROPHYTES	10	20	20	20	30	20	20	40	25	30	40	50	40	50	50	40	30	40	20	20	20	30	20	40	40	100	135	230	150	150
MISCELLANEOUS																														
SAND																														
SILT	90	80	70	80	70	70	80	60	75	70	60	50	60	50	50	60	70	60	80	60	20	70	80	60	60	390	355	270	330	290

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE																														
BOULDERS																					10									10
COBBLE																														
DETRITUS	15	15	15	15	10	20	20	25	20	25			20								30	30	30	30	20	70	110	20		140
LEAVES			15	10	5		5	10																		30	15		10	
LOGS					5	20	10	5			10	20	20	40	30	10	40	30	40	40			10	10	10	5	35	120	160	30
MACROPHYTES	10	40	10	10	15	10	10	20	10	15	40	30	20	20	30	40	20	30	30	20	10	15	10	10	10	85	65	140	140	55
PERIPHYTON	15	30	10	20	20	20	30	40	30	20	20	30	20	30	30	20	30	30	30	20	30	20	30	20	20	95	140	130	130	120
PINE NEEDLES																			10											10

DUCK LAKE 30-SEP-96 WETLAND STUDY

REPLICATE #	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK			50	30	20																20	10	20			100				50
BOULDERS								10	10		40	20	30	30	30	20	40	40	30	30							20	150	160	
CLAY																														
COBBLE	20	20									30	30	40	30	10			20	10	20						40		140	50	
GRAVEL																														
LOGS	10	10		10	10	30	20	20	20	20	10	10	10	10	10	20	20	10	10	10	10	30	20	20	20	40	110	50	70	100
MACROPHYTES	30	40	30	20	30	40	40	20	30	20	10	20	10	20	30	20	10	10	20	20	40	30	40	50	40	150	150	90	80	200
SAND																										0	0	0	0	0
SILT	40	30	20	40	40	30	40	50	40	60	10	20	10	10	20	40	30	20	30	20	30	30	20	30	40	170	220	70	140	150

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>WATER COLUMN</u>																															
ALGAE						5				5	5	5			5			10									10	20	10		
BOULDERS								10	10							20	10	20	10	10	10	10	5			20		70	15		
COBBLE																		10											10		
DETRITUS		5	10	20		10	10	5	5	5	5	5	5	10		20	5	10	10	5		15	20	10	15	10	35	35	30	50	70
LEAVES	10	5	10	5	10					5	10	5		5			5			5	5	10	15		5	40	5	20	10	35	
LOGS	20	10	10	10	15	20	20	20	20	20	10	10	10	10	10	20	20	10	20	30	20	20	30	10	20	65	100	50	100	100	
MACROPHYTES	40	30	30	30	30	40	30	10	20	20	10	20	20	30		20	20	20	20	30	40	30	30	40	30	160	120	100	110	170	
PERIPHYTON	20	20	10	10	20	20	10	10	10		5	20	10	10	10	10	10	10	5	10	10	5	10	10	10	80	50	55	45	45	
PINE NEEDLES																															

PLOT 2 POND 19 LAKE 23-SEP-96 WETLAND STUDY

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS					
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
<u>QUADRAT FLOOR</u>																															
BEDROCK						50	30	40	60		70	30	60	40	40	40	50	40	40	40	40	40	40	40	40	180	240	210	200		
BOULDERS																															
CLAY																															
COBBLE																															
GRAVEL																															
LOGS																20			20					10				40	10		
MACROPHYTES	20	20	20	20	20	50	20	50	20	20	20	30	10	40	40	20	40	40	40	20	40	40	40	30	30	30	100	160	140	160	170
SAND																															
SILT	80	80	80	80	80	50	30	20	40	20	10	40	30	20	20	20	10	20	20	20	20	20	20	30	20	30	400	160	120	90	120

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
WATER COLUMN																															
ALGAE						10	20	10			25								10		10					40	25	10	10		
BOULDERS																															
COBBLE																															
DETRITUS	30	20	10	5	10	10	10	10	10	10	5	10	20	10	10	10	10	10	10	20	15	20	20	20	15	20	75	50	55	65	95
LEAVES															10		10				10		10					10	10	20	
LOGS																30			10		10							40	10		
MACROPHYTES	10	10	20	10	10	20	20	20	20	10	30	20	5	25	20	10	20	30	10	20		10	15	25	20	60	90	100	90	70	
PERIPHYTON	20	20	10	20	20	40	40	30	40	20	30	40	20	30	30	20	20	20	25	20	20	20	30	20	20	90	170	150	105	110	
PINE NEEDLES																					10		10	10	10				40		

PLOT 2 POND 9 LAKE 19-SEP-96 WETLAND STUDY

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY																														
COBBLE																														
GRAVEL																														
LOGS	30	70	70	60	30	20	20	30	40	30	20	20	30	20	30	30	20	30	20	10	50	30	20	20	20	260	140	120	110	140
MACROPHYTES	20	10	20	20	10	10	20	20	20	10	20	30	30	10	10	30	10	10	20	10	20	20	10	20	20	80	80	100	80	90
SAND																														
SILT	50	20	10	20	60	70	60	50	40	60	60	50	40	70	60	40	70	60	60	80	30	50	70	60	60	160	280	280	310	270

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	20	10	10	10	10	10		10	20		20	20	20	10	10		10	30	20	30	10	20	10	10	10	60	40	80	90	60
BOULDERS																														
COBBLE																														
DETRITUS	10	20	10	10		30	20				20	10	10	20		10	20		10		10	10	20	20	10	50	50	60	40	70
LEAVES					10	20			10	10	10					10			10	10	10	10		30	10	10	40	10	30	60
LOGS	10	20	20	20	20					20		10	10	10	20	10	10			10		20	10		20	90	20	50	30	50
MACROPHYTES	60	30	40	50	10	20	30	30	40	30	30	30	30	20	30	30		20	30	30	30	30	30	20	20	190	150	140	110	130
PERIPHYTON	20	20	20	10	20	10	20	30	20	20	20	20	20	20	10	20	20	10	10	20	20	20	10	20	10	90	100	90	80	80
PINE NEEDLES	10		10	10	10	20	10	10	20	10	20	10	10	10		10	10	10	10	10	20	20	10	20		40	70	50	50	70

RED CHALK LAKE 02-OCT-96 WETLAND STUDY

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY																														
COBBLE																														
GRAVEL				10	20	20	10		10		10	20	20	10	20	10	20	20	10	10		10	10	20	20	30	40	80	70	60
LOGS	10	5	10	20	20	10		10	10	10	10	20	10	10	10	20	10	10	10	20	10	20	20	10	20	65	40	60	70	80
MACROPHYTES	40	45	60	40	30	40	30	30	30	40	30		20	20	20	20	30	30	20	20	30	20	30	40	30	215	170	90	120	150
SAND															10															
SILT	50	50	30	30	30	30	60	60	50	50	50	60	50	50	50	40	40	40	60	50	60	50	40	30	30	190	250	260	230	210

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE	20	20	20	10	20	10	10	20	10	10	10	5	10	20	10	5	10	20	15	15	10	10	20	10	10	90	60	55	65	60
BOULDERS																														
COBBLE																														
DETRITUS	10	20	30	30	40	60	50	50	30	20	20	10	10	10	10	25	20	30	25	25	30	40	50	40	30	130	210	60	125	190
LEAVES	10	10	10	5	5	10	20	10	20	20	20	20	15	10	15	10	10	10	10	10	20			5	5	40	80	80	50	30
LOGS	10	20	20	30	5						20	30	25	5	25	25	20	10	10	5	20	20	10	10	30	85		105	70	90
MACROPHYTES	40	30	40	50	40	20	20	30	30	50	30	30	25	30	25	20	30	20	30	30		30	30	20	10	200	150	140	130	90
PERIPHYTON					10	10	5	10	10	10	10	10	10	10	10	10	20	10	5	5	10	10		5		10	45	50	50	25
PINE NEEDLES																														

RUSH LAKE 30-SEP-96 WETLAND STUDY

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS																														
CLAY											30	20	40	40	40	20	20	10	20	20								170	90	
COBBLE																10			10										20	
GRAVEL																														
LOGS					10											10	10	20	10	10		10	10	10	10	10	10		60	40
MACROPHYTES	40	20	10	30	20	40	40	30	40	30	40	60	40	30	30	40	60	40	40	40	60	60	50	30	50	120	180	200	220	250
SAND																														
SILT	60	80	90	70	70	60	60	70	60	70	30	20	20	30	30	20	10	30	20	30	40	30	40	60	40	370	320	130	110	210

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
WATER COLUMN																														
ALGAE						30	30	30	30	40			20		10	10	10		5								160	30	25	
BOULDERS																														
COBBLE																														
DETRITUS	10	5		15	20	10	10	10	10	10	5				5		5				5	10	10	10		50	50	10	5	35
LEAVES				5	15			5																		20	5			
LOGS					5						10		5	10	10		10	10	10	5		10	20	10		5		35	35	40
MACROPHYTES	40	30	10	20	30	30	40	30	40	30	60	60	40	30	30	30	40	30	30	30	30	40	40	30	50	130	170	220	160	190
PERIPHYTON	10	10	5	10	10	10	20	10					10	20	10	10	10	10	10	10	10	10		10	10	45	40	40	50	40
PINE NEEDLES																10													10	

SLIM LAKE 26-SEP-96 WETLAND STUDY

	SITE 1					SITE 2					SITE 3					SITE 4					SITE 5					SITE TOTALS				
REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>QUADRAT FLOOR</u>																														
BEDROCK																														
BOULDERS														10														10		
CLAY																														
COBBLE				5				20		20	20	10	10	10	20		10				10	10	10	10	5	5	40	70	10	45
GRAVEL			20		10	20	10	20		10	20	10	10	10	10	10	10	20	10	10	10	10				30	60	60	60	20
LOGS				10			10		10	10														20		10	30			20
MACROPHYTES	40	60	40	35	40	30	30	30	40	30	20	30	20	20	20	30	40	30	40	30	40	55	30	35	40	215	160	110	170	200
SAND	40	20	20	20	30	30	30	20	30	10	30	30	30	30	30	30	20	40	30	40	10	5	10	15	5	130	120	150	160	45
SILT	20	20	20	30	20	20	20	10	20	20	10	20	30	20	20	30	20	10	20	20	30	20	50	40	30	110	90	100	100	170

REPLICATE #	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>WATER COLUMN</u>																														
ALGAE							10				5	10	10			10		5	10	20	10	5	10		5		10	25	45	30
BOULDERS																														
COBBLE							10														10		5				10			15
DETRITUS	10	10	5	5	10	10	20	10		5	10	20	5	10	20		5	5	10		10	20	10	10	20	40	45	65	20	70
LEAVES											5																			
LOGS		5		10			10		10	5	10		10	10	5			5		10		10	5		5	15	25	35	15	20
MACROPHYTES	20	10	20	30	20	20	30	20	30	30	30	20	30	20	20	30	40	30	30	40	30	30	20	40	30	100	130	120	170	150
PERIPHYTON	30	40	30	30	30	30	20	30	40	30	30	20	20	30	30	30	20	20	30	30	40	30	30	30	40	160	150	130	130	170
PINE NEEDLES																					10	5		10						25

Appendix 3:
Littoral Habitat Substrate Summarized by Site
for the 59 Lakes

		QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)								
LAKE	SITE	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES
BALSAM	1	0	0	0	0	0	15	135	80	240	30	45	0	0	25	15	5	435	0	0
	2	0	0	0	125	285	0	0	65	25	0	105	170	250	10	10	0	0	345	0
	3	0	0	0	0	0	45	20	115	155	165	25	0	0	75	15	150	20	175	0
	4	0	0	0	0	10	10	15	395	60	10	45	0	0	10	25	50	30	340	0
	5	175	30	0	205	35	0	0	30	25	0	0	20	155	0	0	0	0	500	0
BASSHAUNT	1	60	70	0	140	0	0	10	140	65	5	0	100	95	40	20	15	20	0	15
	2	0	0	0	0	0	100	10	45	280	65	0	0	0	185	25	120	15	95	0
	3	0	0	0	135	25	0	15	275	50	0	5	15	50	45	45	55	25	100	10
	4	0	0	0	0	45	10	80	260	105	0	0	0	0	120	25	35	190	80	0
	5	0	0	0	0	0	130	55	0	315	0	0	0	0	125	0	180	100	0	0
BEAR	1	0	0	145	0	15	45	45	155	95	0	0	0	0	75	75	60	30	130	40
	2	0	0	60	70	25	70	40	125	110	0	0	0	40	75	85	70	40	125	65
	3	0	0	60	90	65	30	45	95	115	0	0	0	50	40	90	50	30	145	30
	4	0	0	80	105	70	5	55	110	75	0	0	0	60	35	115	20	30	125	55
	5	0	0	0	0	0	125	0	250	120	0	0	0	0	275	190	60	0	50	70
BIGWIND	1	0	0	0	0	0	15	120	295	65	5	40	0	0	45	115	15	255	0	15
	2	20	95	0	80	0	0	15	5	230	55	10	120	15	55	20	35	85	115	0
	3	0	40	0	180	90	0	35	130	25	0	0	0	10	55	10	0	70	225	0
	4	15	0	0	0	0	20	75	0	250	140	0	50	0	220	25	40	155	0	25
	5	0	15	0	335	60	0	20	40	30	0	0	0	0	45	45	10	35	240	0
BLUE CHALK	1	0	0	0	0	0	0	90	310	100	0	0	0	0	45	160	15	185	0	20
	2	0	0	0	15	75	30	5	220	130	25	0	0	5	105	210	100	5	120	5
	3	0	0	0	95	80	0	55	120	150	0	5	0	10	95	175	55	120	70	0
	4	0	0	0	75	65	5	25	175	155	0	0	0	20	125	100	90	115	110	0
	5	15	0	0	20	60	10	0	265	130	0	0	0	0	170	170	65	30	85	0
BOSHKUNG	1	90	0	0	100	130	0	10	150	20	0	0	70	50	20	70	0	5	0	35
	2	0	0	0	155	90	0	75	95	85	0	0	0	55	75	30	0	105	0	30
	3	0	10	0	35	40	60	105	110	140	0	0	0	0	95	60	90	90	10	5
	4	0	40	0	50	40	25	110	110	125	0	0	20	0	70	60	15	85	0	25
	5	0	0	0	110	50	25	5	130	180	0	15	0	70	65	25	40	0	5	40

LAKE	SITE	QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)								
		BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES
BRANDY	1	0	0	270	0	0	0	95	60	75	0	0	0	0	60	25	15	255	0	25
	2	0	0	0	0	0	5	185	25	285	0	100	0	0	115	25	5	405	0	0
	3	0	0	50	0	0	55	130	25	240	0	60	0	0	115	25	65	280	0	0
	4	0	0	80	0	0	15	125	25	255	0	55	0	0	120	55	95	260	0	0
	5	0	0	110	0	35	0	5	200	150	0	0	0	0	45	105	0	10	0	0
BUCK	1	0	125	0	120	25	0	0	135	95	0	0	90	65	95	85	90	0	195	0
	2	0	35	0	70	0	55	50	40	250	0	0	30	20	155	55	110	90	120	0
	3	0	10	0	0	0	5	205	25	255	0	5	0	0	50	30	10	410	285	15
	4	0	25	0	25	15	20	15	80	320	0	0	0	0	70	400	75	45	0	35
	5	0	20	0	25	15	50	0	90	300	0	0	15	10	120	135	100	5	145	5
BUCKHORN	1	0	20	0	120	70	35	65	65	125	0	0	10	105	125	120	30	60	70	0
	2	0	40	0	130	110	25	0	100	95	0	0	0	70	50	25	20	0	75	0
	3	0	60	0	180	65	20	10	105	60	0	25	30	90	50	30	30	10	170	15
	4	0	75	0	130	50	10	0	155	80	0	0	50	60	30	60	20	0	235	20
	5	0	10	110	15	50	15	50	140	120	0	0	5	5	35	40	25	30	115	0
CHEMUNG	1	0	20	0	45	20	0	15	295	105	0	0	20	35	35	10	30	30	140	0
	2	0	0	0	335	40	0	0	85	40	0	0	0	215	60	0	35	0	390	0
	3	0	0	0	95	50	0	15	290	50	0	0	0	45	65	25	90	30	265	0
	4	0	0	0	0	25	15	35	345	80	0	0	0	0	70	55	55	60	0	0
	5	0	40	0	30	0	15	30	255	130	0	0	25	15	60	75	60	60	95	5
CHUB	1	0	10	0	0	0	55	150	100	185	0	0	0	0	70	110	40	325	70	0
	2	10	20	0	130	95	60	55	130	0	0	0	10	40	145	60	65	95	15	0
	3	0	20	0	0	0	80	145	50	205	0	0	0	0	145	50	75	275	30	10
	4	0	65	0	0	0	75	55	160	145	0	0	10	0	155	75	40	155	25	10
	5	0	25	0	5	5	25	0	440	0	0	0	20	0	5	320	30	0	0	25
CLAYTON	1	0	0	0	20	0	35	190	0	230	25	305	0	5	45	25	15	420	0	0
	2	0	5	0	55	95	20	25	165	130	5	85	0	60	65	30	85	60	130	0
	3	0	0	0	0	0	145	140	0	170	45	245	0	5	60	35	55	360	0	0
	4	0	35	0	100	10	30	30	45	210	40	65	20	115	95	30	70	0	155	15
	5	50	0	0	10	0	90	0	25	285	40	35	0	15	120	35	220	0	150	5

		QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)									
LAKE	SITE	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES	
CLEAR	1	0	0	0	120	140	0	30	150	60	0	20	0	90	45	0	0	50	40	0	
	2	0	20	0	100	0	50	0	290	40	0	0	20	20	55	65	85	0	0	55	
	3	0	20	0	10	30	40	45	190	165	0	0	0	20	80	40	40	80	30	40	
	4	0	0	0	0	70	60	100	230	40	0	0	0	0	70	45	80	130	55	15	
	5	0	0	0	20	0	60	70	0	350	0	30	0	0	150	65	80	100	40	45	
CLEARWATER	1	0	0	0	85	125	0	30	145	115	0	40	0	90	20	5	10	45	345	0	
	2	90	25	0	150	130	0	0	75	30	0	0	25	120	0	5	15	0	320	0	
	3	0	30	0	35	85	0	60	135	155	0	30	30	50	30	0	15	115	355	0	
	4	0	15	0	160	145	0	0	125	55	0	10	15	155	35	0	0	5	330	0	
	5	0	0	0	15	30	0	105	160	190	0	35	10	35	50	0	0	230	420	0	
CRADLE	1	10	35	0	5	0	120	0	130	200	0	0	25	0	145	35	120	0	0	15	
	2	0	5	0	0	0	95	0	0	400	0	20	5	0	380	20	105	5	0	5	
	3	10	65	0	35	5	65	0	30	290	0	0	45	10	210	10	105	0	0	0	
	4	0	30	0	5	0	80	0	5	380	0	5	10	0	370	25	65	5	0	5	
	5	0	45	0	25	35	40	65	180	120	0	0	40	45	65	25	75	220	0	0	
CROSSON	1	0	110	0	170	5	0	35	65	105	10	125	150	45	70	60	10	70	270	15	
	2	45	20	0	125	125	0	0	130	55	0	150	70	50	50	45	25	30	150	20	
	3	70	0	0	0	0	5	185	75	165	0	160	0	5	75	75	20	350	0	15	
	4	0	10	0	30	30	0	10	350	60	10	50	10	5	210	35	85	20	135	10	
	5	0	0	0	30	35	10	45	130	190	60	110	20	10	90	125	25	120	135	25	
CROWN	1	0	0	0	20	0	115	60	0	305	0	0	0	5	150	60	120	60	75	25	
	2	0	10	0	0	0	100	65	50	275	0	0	0	0	150	75	100	80	50	0	
	3	0	20	0	45	0	70	120	0	245	0	0	0	0	140	90	50	100	20	5	
	4	0	25	0	85	30	45	0	315	0	0	0	10	10	100	50	80	0	15	20	
	5	0	0	0	40	100	15	100	195	50	0	0	10	0	60	70	45	90	45	25	
DELANO	1	0	0	0	25	45	40	155	215	15	0	0	0	15	25	50	60	165	0	15	
	2	10	60	0	30	10	60	0	50	270	0	10	50	15	90	45	75	10	0	10	
	3	0	0	0	0	0	10	30	0	460	0	15	0	0	320	5	15	135	10	0	
	4	0	120	0	40	15	55	20	55	195	0	0	40	0	270	20	90	30	0	5	
	5	0	80	0	125	0	50	5	175	65	0	0	20	30	320	35	85	5	0	10	

		QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)									
LAKE	SITE	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES	
DICKIE	1	155	55	0	25	20	0	25	110	110	0	110	115	35	5	40	20	120	320	0	
	2	0	40	0	150	65	0	55	95	95	0	80	40	100	40	0	25	180	240	0	
	3	0	55	0	35	10	0	55	225	120	0	180	45	20	0	10	10	90	50	0	
	4	0	40	0	70	125	0	45	140	80	0	65	20	50	0	30	15	115	20	0	
	5	0	70	55	50	60	0	85	65	115	0	250	50	15	0	30	15	235	100	0	
DICKY	1	75	40	0	25	30	15	5	225	85	0	5	25	10	80	105	120	10	35	25	
	2	50	25	0	65	0	45	15	120	180	0	0	20	45	100	125	65	20	10	20	
	3	0	80	0	50	225	0	0	85	60	0	0	50	25	55	140	55	0	15	25	
	4	0	0	0	0	0	85	70	130	215	0	0	0	0	145	125	80	70	35	35	
	5	0	20	0	75	25	0	10	235	135	0	0	10	15	115	80	80	20	55	0	
FAWN	1	0	0	65	40	0	5	125	55	210	0	125	0	0	50	10	10	260	0	0	
	2	0	0	200	0	0	0	175	10	115	0	105	0	0	35	0	0	340	0	0	
	3	0	0	0	0	70	0	85	290	55	0	75	0	0	30	0	0	180	0	0	
	4	0	0	0	0	95	10	30	170	185	10	55	0	0	45	0	15	55	0	0	
	5	0	0	130	15	0	0	165	25	165	0	75	0	0	75	0	5	335	0	0	
GLEN	1	0	0	0	0	30	55	35	135	245	0	10	0	0	125	25	60	70	45	25	
	2	0	0	0	0	60	45	20	165	210	0	0	0	0	115	25	75	35	25	0	
	3	0	0	0	0	50	40	70	120	220	0	0	0	0	75	35	60	45	105	0	
	4	0	0	0	0	25	50	45	80	300	0	0	0	5	160	60	110	100	70	30	
	5	0	0	0	0	45	55	65	90	245	0	0	0	0	135	45	75	65	40	20	
HALLS	1	20	0	0	20	0	40	30	390	0	0	0	0	20	100	45	65	20	30	60	
	2	0	40	0	120	115	10	60	155	0	0	0	20	60	110	50	40	50	10	10	
	3	0	0	0	0	0	10	140	240	110	0	0	0	10	150	45	10	100	0	10	
	4	0	0	0	50	40	10	80	210	110	0	15	0	20	115	30	20	80	35	20	
	5	0	0	0	0	50	0	0	400	50	0	0	0	0	250	50	0	0	0	0	
HAMER	1	0	0	0	0	0	40	145	50	255	0	80	0	0	190	45	20	110	50	15	
	2	0	20	0	0	0	60	100	45	275	0	35	10	0	230	65	60	95	55	75	
	3	180	0	0	0	0	20	55	85	160	0	55	0	0	150	50	35	90	55	20	
	4	30	0	0	0	0	40	160	75	195	0	50	0	0	195	65	75	145	55	5	
	5	0	0	0	0	0	40	130	40	290	0	0	0	0	255	115	70	155	65	45	

		QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)									
LAKE	SITE	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES	
HANNAH	1	30	0	0	10	65	35	125	105	130	0	0	30	5	40	10	35	350	480	0	
	2	0	60	0	40	10	0	100	60	230	0	20	40	10	60	60	10	210	460	0	
	3	20	40	0	20	15	5	30	190	170	0	0	60	20	35	10	10	55	390	0	
	4	40	10	140	60	50	0	20	80	100	0	25	15	5	35	5	30	60	335	0	
	5	0	130	10	205	35	0	5	60	55	0	0	100	190	20	15	25	5	490	0	
HARP	1	0	0	0	40	40	15	0	255	150	0	15	15	65	30	95	15	5	190	15	
	2	45	120	0	100	5	0	50	75	105	0	0	105	30	20	20	0	90	415	0	
	3	0	20	0	65	20	5	15	245	130	0	10	45	30	20	30	45	30	315	0	
	4	0	0	0	15	5	10	155	110	205	0	150	0	0	90	40	15	360	180	5	
	5	0	15	0	40	25	20	35	270	95	0	45	0	15	85	25	55	80	220	0	
HENEY	1	0	0	0	15	55	0	140	210	75	5	125	0	0	40	35	40	385	220	0	
	2	85	25	0	0	0	45	40	0	265	40	155	40	10	75	50	60	60	240	30	
	3	0	0	0	0	0	130	25	25	250	70	55	0	0	90	85	75	50	270	35	
	4	0	15	0	30	10	40	125	80	165	35	130	15	15	65	25	65	265	200	20	
	5	0	110	0	25	0	0	145	25	195	0	50	10	0	35	35	30	315	220	10	
KAWAGAMA	1	0	20	0	65	100	0	0	265	50	0	0	20	40	60	70	155	0	200	50	
	2	0	0	0	190	135	30	0	90	45	0	0	0	125	35	0	25	0	275	0	
	3	0	85	0	190	110	20	0	60	35	0	0	60	90	60	90	10	0	190	50	
	4	30	45	0	80	65	10	10	165	95	0	0	35	50	60	65	80	25	250	30	
	5	0	20	0	45	40	10	5	240	140	0	0	15	20	45	20	30	15	375	20	
KOSHLONG	1	0	20	0	15	20	0	85	15	310	35	20	10	20	120	30	5	175	465	15	
	2	90	10	0	5	0	5	145	0	230	20	90	10	30	35	25	15	360	390	0	
	3	0	0	0	0	35	0	0	435	30	0	0	0	0	230	60	15	0	125	15	
	4	0	0	0	15	60	0	10	385	30	0	15	0	0	265	20	0	30	80	70	
	5	0	0	0	5	110	0	0	330	55	0	0	40	5	10	0	0	0	385	0	
LEONARD	1	75	70	0	20	0	30	30	165	110	0	0	35	10	125	105	80	40	25	45	
	2	0	0	0	0	0	45	15	65	375	0	0	0	0	320	105	65	40	0	45	
	3	0	40	85	10	30	35	55	160	85	0	0	30	20	55	60	65	45	35	30	
	4	65	0	95	70	75	0	15	5	175	0	0	60	60	70	50	35	60	55	30	
	5	85	0	105	20	20	0	0	65	205	0	0	10	40	85	90	10	75	40	55	

		QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)								
LAKE	SITE	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES
LOHI	1	0	0	265	10	0	5	65	30	125	0	20	0	5	60	0	15	190	455	0
	2	0	0	0	20	25	25	25	30	375	0	15	0	20	190	5	120	50	345	0
	3	40	0	110	40	45	10	35	105	115	0	15	5	30	5	0	25	75	415	0
	4	0	0	0	130	150	5	10	135	70	0	5	0	120	95	0	40	40	325	0
	5	0	0	200	105	70	0	0	85	40	0	0	0	120	60	5	15	0	355	0
LOUISA	1	0	0	0	0	0	5	75	335	85	0	40	0	0	25	0	30	170	110	15
	2	0	0	0	80	80	0	35	245	60	0	25	0	55	55	5	50	65	165	0
	3	25	10	0	110	80	0	0	190	80	5	35	40	45	70	15	25	0	185	10
	4	0	0	0	0	0	50	65	5	320	60	105	0	0	130	10	60	130	250	0
	5	0	0	0	15	5	10	45	0	370	55	65	0	10	100	5	30	95	65	0
MEACH	1	0	75	0	65	35	0	65	110	150	0	0	70	20	70	15	20	140	45	0
	2	0	55	0	20	0	40	25	25	330	0	0	25	0	115	85	95	60	85	0
	3	0	0	0	0	0	45	80	120	255	0	0	0	0	65	40	85	90	30	0
	4	0	0	0	20	50	15	120	105	190	0	0	0	0	100	65	45	90	50	0
	5	0	0	0	0	0	45	85	190	180	0	0	0	0	65	60	60	60	30	0
MIDDLE	1	0	0	45	20	55	5	35	180	150	10	0	0	15	35	0	45	50	490	0
	2	90	10	5	60	60	0	35	80	160	0	25	0	25	50	30	15	125	460	0
	3	30	10	0	200	60	0	10	75	115	0	0	30	45	20	20	55	20	495	0
	4	0	20	0	180	95	25	5	80	95	0	0	10	65	45	0	150	35	480	0
	5	0	110	0	120	30	0	15	85	130	0	0	110	65	5	0	55	25	495	0
MOOT	1	90	10	0	120	35	0	70	60	115	0	10	25	25	50	5	0	140	180	0
	2	0	85	0	70	50	0	75	95	125	0	35	15	15	55	60	25	165	20	15
	3	0	30	0	10	20	5	5	285	115	25	0	30	0	50	20	10	10	0	0
	4	0	0	0	65	45	5	10	280	70	25	10	0	5	65	130	45	15	0	20
	5	30	75	0	90	15	0	80	75	135	10	60	40	10	45	95	10	185	10	0
MOUSE	1	0	10	0	0	0	115	30	20	325	0	0	0	0	270	40	75	55	0	25
	2	0	75	0	40	10	55	55	175	90	0	0	25	0	170	45	20	145	55	25
	3	0	0	0	0	0	95	55	295	55	0	0	0	0	190	60	60	120	30	30
	4	15	50	0	0	0	70	45	75	245	0	0	20	0	160	65	30	150	40	30
	5	0	25	0	40	15	95	50	170	95	0	0	0	10	130	40	65	125	15	30

		QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)									
LAKE	SITE	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES	
PEARCELEY	1	0	275	0	45	35	0	0	70	75	0	35	120	25	60	40	55	0	85	0	
	2	70	0	0	20	20	5	20	295	70	0	25	0	10	35	15	30	30	0	0	
	3	150	90	0	20	10	30	30	60	110	0	0	10	30	80	65	90	15	90	0	
	4	0	125	0	15	20	5	40	145	150	0	60	60	5	55	65	25	85	90	0	
	5	0	90	0	120	50	0	0	75	130	0	65	65	30	70	45	80	5	135	0	
PINCHER	1	0	20	0	20	0	45	5	320	90	0	0	20	20	140	110	55	10	0	35	
	2	80	70	0	70	15	50	5	185	25	0	0	100	55	160	45	70	0	30	15	
	3	20	110	0	35	15	25	20	55	210	0	135	105	0	125	45	35	40	0	0	
	4	0	15	0	0	0	75	10	0	400	0	10	0	0	395	40	70	15	0	15	
	5	0	55	0	20	10	60	10	345	0	0	0	30	5	315	40	80	10	0	10	
PLASTIC	1	10	45	0	0	0	45	65	160	175	0	0	5	0	230	50	60	160	45	15	
	2	225	0	0	10	0	45	40	40	140	0	0	0	0	275	5	65	105	40	0	
	3	30	0	0	10	10	65	55	125	205	0	0	0	5	175	80	30	90	35	120	
	4	0	160	0	55	15	45	45	150	30	0	0	95	0	160	30	55	120	60	15	
	5	0	115	0	0	10	45	55	220	45	0	0	40	0	190	60	55	120	65	15	
RANGER	1	0	0	0	45	45	60	25	250	75	0	0	0	15	200	45	75	30	0	0	
	2	0	0	0	10	60	45	95	250	30	0	0	0	5	95	10	45	180	0	0	
	3	0	0	0	0	5	35	105	290	65	0	0	0	0	145	35	50	250	0	5	
	4	0	5	0	0	55	40	45	275	60	0	0	0	0	115	40	60	75	0	5	
	5	0	0	0	0	30	45	80	285	60	0	0	0	0	210	30	55	190	0	0	
RED CHALK EAST	1	0	0	0	35	40	45	10	85	240	45	5	0	0	295	95	80	15	95	35	
	2	0	65	0	285	15	0	55	35	45	0	5	110	110	15	15	15	165	380	10	
	3	0	0	0	190	40	0	0	145	100	25	0	0	25	60	240	30	0	20	15	
	4	0	0	0	190	90	0	10	165	45	0	0	0	20	50	200	30	20	40	5	
	5	0	0	0	175	20	0	55	25	225	0	0	0	45	30	75	15	135	60	0	
RED CHALK MAIN	1	0	0	0	55	55	0	30	235	100	25	0	0	30	50	95	60	75	0	0	
	2	20	60	0	0	30	20	65	180	105	20	0	20	0	180	120	90	185	230	5	
	3	0	0	0	0	5	85	5	125	215	65	15	0	0	210	115	160	5	140	0	
	4	0	0	0	260	30	0	35	140	35	0	0	0	140	65	10	25	55	10	0	
	5	0	0	0	15	110	0	30	295	50	0	0	0	20	45	10	45	105	0	0	

LAKE	SITE	QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)								
		BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES
RIDOUT	1	0	40	0	55	65	0	35	230	65	10	15	55	20	90	30	80	80	155	50
	2	0	55	0	70	35	10	75	200	50	5	5	55	20	70	25	40	185	85	10
	3	15	15	0	130	50	0	70	160	60	0	25	25	55	25	10	55	140	130	0
	4	15	30	0	85	35	0	45	205	80	5	35	60	20	85	40	75	90	105	0
	5	0	0	0	0	5	15	120	145	195	20	5	0	0	35	55	35	240	10	0
SCUGOG	1	0	0	0	15	10	0	50	190	245	0	30	0	15	0	0	0	100	50	0
	2	0	20	0	70	65	10	20	180	125	0	0	20	85	25	0	10	25	30	0
	3	0	0	0	0	10	0	0	410	80	0	0	0	0	10	0	0	0	10	0
	4	0	0	0	0	0	20	240	0	240	0	0	0	0	40	20	50	500	0	0
	5	0	0	0	75	45	5	15	205	155	0	50	0	10	5	5	0	25	25	0
SHERBORNE	1	0	0	150	0	0	0	200	0	150	0	50	0	0	50	0	50	50	0	0
	2	0	0	0	0	45	100	5	215	135	0	0	0	0	130	55	170	10	0	20
	3	0	30	0	80	0	70	45	50	225	0	30	0	0	110	65	100	90	0	25
	4	0	30	0	105	0	105	45	20	195	0	0	0	20	110	85	110	55	20	0
	5	0	0	0	60	0	50	70	0	320	0	0	0	0	135	60	20	140	0	10
SKIDWAY	1	170	40	0	40	0	10	0	240	0	0	15	0	0	70	0	10	5	0	0
	2	460	0	0	0	20	0	0	20	0	0	0	60	0	55	110	65	5	0	0
	3	0	0	0	0	260	0	0	240	0	0	0	10	10	250	95	35	0	0	0
	4	0	0	0	30	130	0	0	340	0	0	0	0	0	280	0	20	0	0	0
	5	0	0	0	0	10	0	0	430	60	0	0	0	0	260	0	85	0	0	0
SMOKE	1	0	30	0	105	50	10	120	95	90	0	0	30	75	45	0	80	245	175	0
	2	0	0	0	0	50	55	25	195	175	0	0	0	0	115	60	135	55	150	20
	3	0	0	0	0	25	85	0	50	340	0	0	0	0	245	45	175	0	220	0
	4	0	0	0	160	70	0	10	205	55	0	0	0	100	55	25	65	25	170	20
	5	0	125	0	85	35	0	0	160	95	0	0	85	45	50	55	30	0	180	0
TIMBERWOLF	1	0	20	0	40	0	5	0	390	45	0	5	20	5	20	20	90	5	0	35
	2	0	0	0	0	0	0	90	290	120	0	125	0	0	0	15	125	10	0	45
	3	0	0	0	10	0	110	0	0	310	70	35	0	0	130	10	155	0	0	120
	4	0	0	0	0	0	10	105	195	190	0	115	0	0	90	20	40	180	55	0
	5	0	90	0	60	45	0	20	175	110	0	15	75	135	0	0	0	30	0	0

		QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)								
LAKE	SITE	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES
TWELVE MILE	1	0	0	0	315	70	0	0	85	25	0	0	0	95	0	5	0	0	430	0
	2	0	0	0	205	70	0	35	130	60	0	0	0	5	10	5	0	75	210	0
	3	0	5	0	20	10	0	150	130	185	0	0	5	0	35	55	15	320	195	0
	4	0	55	0	260	20	0	45	75	45	0	60	50	45	50	30	15	135	385	5
	5	0	0	0	105	85	0	105	140	65	0	0	0	0	25	25	0	260	130	0
WESTWARD	1	0	0	0	0	0	20	45	350	85	0	0	0	0	70	55	45	60	0	45
	2	105	115	0	40	20	50	0	35	135	0	0	25	0	270	25	155	0	0	40
	3	0	0	0	0	25	105	0	195	175	0	0	0	0	220	310	135	0	0	0
	4	10	125	0	80	95	0	40	125	25	0	0	100	15	50	25	5	90	25	35
	5	0	50	0	10	10	25	60	135	210	0	0	10	5	145	45	60	90	30	50
YOUNG	1	0	0	0	5	45	0	70	330	50	0	0	0	0	85	145	50	140	10	25
	2	0	0	0	0	0	0	5	385	110	0	0	0	0	165	40	20	10	0	25
	3	0	0	0	0	25	0	0	425	50	0	0	0	0	65	85	35	0	40	20
	4	0	0	0	0	0	95	55	80	270	0	0	0	0	115	45	125	115	25	0
	5	0	0	0	55	30	0	30	305	80	0	0	0	20	60	0	30	55	15	25
AVERY	1	0	0	0	0	0	80	55	185	180	0	0	0	0	70	40	10	30	45	20
	2	0	0	0	0	0	90	130	30	250	0	10	0	0	110	40	65	80	180	10
	3	270	0	0	10	0	20	60	60	80	0	0	0	5	50	5	20	50	90	10
	4	0	0	0	0	50	40	140	150	120	0	0	0	0	65	10	50	65	140	10
	5	20	0	0	0	0	85	135	0	260	0	0	0	0	60	10	55	95	160	15
DAWSON	1	0	0	0	10	0	0	100	0	390	0	0	0	0	70	30	5	85	0	0
	2	0	0	0	0	10	10	135	0	355	0	0	0	0	110	15	35	65	0	0
	3	0	0	0	0	0	0	230	0	270	0	0	0	0	20	0	120	140	0	0
	4	0	0	0	0	20	20	150	0	330	0	0	0	0	0	10	160	140	0	0
	5	60	0	0	0	0	0	150	0	290	0	0	10	0	140	0	30	55	0	0
DUCK	1	100	0	0	40	0	40	150	0	170	0	0	0	0	35	40	65	160	80	0
	2	0	20	0	0	0	110	150	0	220	0	10	20	0	35	5	100	120	50	0
	3	0	150	0	140	0	50	90	0	70	0	20	0	0	30	20	50	100	55	0
	4	0	160	0	50	0	70	80	0	140	0	10	70	10	50	10	100	110	45	0
	5	50	0	0	0	0	100	200	0	150	0	0	15	0	70	35	100	170	45	0

		QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)								
WETLAND	SITE	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES
PLOT 2 - 19	1	0	0	0	0	0	0	100	0	400	0	0	0	0	75	0	0	60	90	0
	2	180	0	0	0	0	0	160	0	160	0	40	0	0	50	0	0	90	170	0
	3	240	0	0	0	0	0	140	0	120	0	25	0	0	55	10	0	100	150	0
	4	210	0	0	0	0	40	160	0	90	0	10	0	0	65	10	40	90	105	0
	5	200	0	0	0	0	10	170	0	120	0	10	0	0	95	20	10	70	110	40
PLOT 2 - 9	1	0	0	0	0	0	260	80	0	160	0	60	0	0	50	10	90	190	90	40
	2	0	0	0	0	0	140	80	0	280	0	40	0	0	50	40	20	150	100	70
	3	0	0	0	0	0	120	100	0	280	0	80	0	0	60	10	50	140	90	50
	4	0	0	0	0	0	110	80	0	310	0	90	0	0	40	30	30	110	80	50
	5	0	0	0	0	0	140	90	0	270	0	60	0	0	70	60	50	130	80	70
RCE POND 1	1	0	0	0	0	30	65	215	0	190	0	90	0	0	130	40	85	200	10	0
	2	0	0	0	0	40	40	170	0	250	0	60	0	0	210	80	0	150	45	0
	3	0	0	0	0	80	60	90	10	260	0	55	0	0	60	80	105	140	50	0
	4	0	0	0	0	70	70	120	0	230	0	65	0	0	125	50	70	130	50	0
	5	0	0	0	0	60	80	150	0	210	0	60	0	0	190	30	90	90	25	0
RUSH	1	0	0	0	0	0	10	120	0	370	0	0	0	0	50	20	5	130	45	0
	2	0	0	0	0	0	0	180	0	320	0	160	0	0	50	5	0	170	40	0
	3	0	0	170	0	0	0	200	0	130	0	30	0	0	10	0	35	220	40	0
	4	0	0	90	20	0	60	220	0	110	0	25	0	0	5	0	35	160	50	10
	5	0	0	0	0	0	40	250	0	210	0	0	0	0	35	0	40	190	40	0
SLIM	1	0	0	0	5	30	10	215	130	110	0	0	0	0	40	0	15	100	160	0
	2	0	0	0	40	60	30	160	120	90	0	10	0	10	45	0	25	130	150	0
	3	0	10	0	70	60	0	110	150	100	0	25	0	0	65	5	35	120	130	0
	4	0	0	0	10	60	0	170	160	100	0	45	0	0	20	0	15	170	130	0
	5	0	0	0	45	20	20	200	45	170	0	30	0	15	70	0	20	150	170	25

Appendix 4:
Littoral Habitat Substrate Summary by Lake
for the 59 Lakes

LAKE	QUADRAT FLOOR (dm ²)										WATER COLUMN (dm ²)									
	BEDROCK	BOULDER	CLAY	COBBLE	GRAVEL	LOG	MACROPHYTE	SAND	SILT	MISC	ALGAE	BOULDER	COBBLE	DETRITUS	LEAVES	LOG	MACROPHYTE	PERIPHYTON	PINE NEEDLES	
BALSAM	175	30	0	330	330	70	170	685	505	205	220	190	405	120	65	205	485	1360	0	
BASSHAUNT	60	70	0	275	70	240	170	720	815	70	5	115	145	515	115	405	350	275	25	
BEAR	0	0	345	265	175	275	185	735	515	0	0	0	150	500	555	260	130	575	260	
BIGWIND	35	150	0	595	150	35	265	470	600	200	50	170	25	420	215	100	600	580	40	
BLUE CHALK	15	0	0	205	280	45	175	1090	665	25	5	0	35	540	815	325	455	385	25	
BOSHKUNG	90	50	0	450	350	110	305	595	550	0	15	90	175	325	245	145	285	15	135	
BRANDY	0	0	510	0	35	75	540	335	1005	0	215	0	0	455	235	180	1210	0	25	
BUCK	0	215	0	240	55	130	270	370	1220	0	5	135	95	490	705	385	550	745	55	
BUCKHORN	0	205	110	575	345	105	125	565	480	0	25	95	330	290	275	125	100	665	35	
CHEMUNG	0	60	0	505	135	30	95	1270	405	0	0	45	310	290	165	270	180	890	5	
CHUB	10	140	0	135	100	295	405	880	535	0	0	40	40	520	615	250	850	140	45	
CLAYTON	50	40	0	185	105	320	385	235	1025	155	735	20	200	385	155	445	840	435	20	
CLEAR	0	40	0	250	240	210	245	860	655	0	50	20	130	400	215	285	360	165	155	
CLEARWATER	90	70	0	445	515	0	195	640	545	0	115	80	450	135	10	40	395	1770	0	
CRADLE	20	180	0	70	40	400	65	345	1390	0	25	125	55	1170	115	470	230	0	25	
CROSSON	115	140	0	355	195	15	275	750	575	80	595	250	115	495	340	165	590	690	85	
CROWN	0	55	0	190	130	345	345	560	875	0	0	20	15	600	345	395	330	205	75	
DELANO	10	260	0	220	70	215	210	495	1005	0	25	110	60	1025	155	325	345	10	40	
DICKIE	155	260	55	330	280	0	265	635	520	0	685	270	220	45	110	85	740	730	0	
DICKEY	125	165	0	215	280	145	100	795	675	0	5	105	95	495	575	400	120	150	105	
FAWN	0	0	395	55	165	15	580	550	730	10	435	0	0	235	10	30	1170	0	0	
GLEN	0	0	0	0	210	245	235	590	1220	0	10	0	5	610	190	380	315	285	75	
HALLS	20	40	0	190	205	70	310	1395	270	0	15	20	110	725	220	135	250	75	100	
HAMER	210	20	0	0	0	200	590	295	1175	0	220	10	0	1020	340	260	595	280	160	
HANNAH	90	240	150	335	175	40	280	495	685	0	45	245	230	190	100	110	680	2155	0	
HARP	45	155	0	260	95	50	255	955	685	0	220	165	140	245	210	130	565	1320	20	
HENEY	85	150	0	70	65	215	475	340	950	150	515	65	25	305	230	270	1075	1150	95	
KAWAGAMA	30	170	0	570	450	70	15	820	365	0	0	130	325	260	245	300	40	1290	150	
KOSHLONG	90	30	0	40	225	5	240	1165	655	55	125	60	55	660	135	35	565	1445	100	
LEONARD	225	110	285	120	125	110	115	460	950	0	0	135	130	655	410	255	260	155	205	
LOHI	40	0	575	305	290	45	135	385	725	0	55	5	295	410	10	215	355	1895	0	
LOUISA	25	10	0	205	165	65	220	775	915	120	270	40	110	380	35	195	460	775	25	
MEACH	0	130	0	105	85	145	375	550	1105	0	0	95	20	415	265	305	440	240	0	
MIDDLE	120	150	50	580	300	30	100	500	650	10	25	150	215	155	50	320	255	2420	0	
MOOT	120	200	0	355	165	10	240	795	560	60	115	110	55	265	310	90	515	210	35	
MOUSE	15	160	0	80	25	430	235	735	810	0	0	45	10	920	250	250	595	140	140	
PEARCELEY	220	580	0	220	135	40	90	645	535	0	185	255	100	300	230	280	135	400	0	
PINCHER	100	270	0	145	40	255	50	905	725	0	145	255	80	1135	280	310	75	30	75	
PLASTIC	265	320	0	75	35	245	260	695	595	0	0	140	5	1030	225	265	595	245	165	
RANGER	0	5	0	55	195	225	350	1350	290	0	0	0	20	765	160	285	725	0	10	
RED CHALK EAST	0	65	0	875	205	45	130	455	655	70	10	110	200	450	625	170	335	595	65	
RED CHALK MAIN	20	60	0	330	230	105	165	975	505	110	15	20	190	550	350	380	425	380	5	
RIDOUT	30	140	0	340	190	25	345	940	450	40	85	195	115	305	160	285	735	485	60	
SCUGOG	0	20	0	160	130	35	325	985	845	0	80	20	110	80	25	60	650	115	0	
SHERBORNE	0	60	150	245	45	325	365	285	1025	0	80	0	20	535	265	450	345	20	55	
SKIDWAY	630	40	0	70	420	10	0	1270	60	0	15	70	10	915	205	215	10	0	0	
SMOKE	0	155	0	350	230	150	155	705	755	0	0	115	220	510	185	485	325	895	40	
TIMBERWOLF	0	110	0	110	45	125	215	1050	775	70	295	95	140	240	65	410	225	55	200	
TWELVE MILE	0	60	0	905	255	0	335	560	380	0	60	55	145	120	120	30	790	1350	5	
WESTWARD	115	290	0	130	150	200	145	840	630	0	0	135	20	755	460	400	240	55	170	
YOUNG	0	0	0	60	100	95	160	1525	560	0	0	0	20	490	315	260	320	90	95	
WETLANDS																				
AVERY	290	0	0	10	50	315	520	425	890	0	10	0	5	355	105	200	320	615	65	
DAWSON POND	60	0	0	10	30	30	765	0	1635	0	0	10	0	340	55	350	485	615	10	
DUCK	150	330	0	230	0	370	670	0	750	0	40	105	10	220	110	415	660	275	0	
PLOT 2 POND 19	830	0	0	0	0	50	730	0	890	0	85	0	0	340	40	50	410	625	40	
PLOT 2 POND 9	0	0	0	0	0	770	430	0	1300	0	330	0	0	270	150	240	720	440	280	
RED CHALK POND 1	0	0	0	0	280	315	745	10	1140	0	330	0	0	715	280	350	710	180	0	
RUSH	0	0	260	20	0	110	970	0	1140	0	215	0	0	150	25	115	870	215	10	
SLIM	0	10	0	170	230	60	855	605	570	0	110	0	25	240	5	110	670	740	25	

Appendix 5:
Littoral Habitat Summary Indices for the 59 Lakes

LAKE	QUADRAT FLOOR (dm ²)								WATER COLUMN (dm ²)			
	SLT+SND	GRA	COB+BOU	BDR+CLA	MAC	LOG	MAC+LOG	MSC	DET+PNS+LVS	MAC+PYT+ALG	LOG	COB+BOU
<u>SUDBURY</u>												
CLEARWATER	1185	515	515	90	195	0	195	0	145	2280	40	530
HANNAH	1180	175	575	240	280	40	320	0	290	2880	110	475
LOHI	1110	290	305	615	135	45	180	0	420	2305	215	300
MIDDLE	1150	300	730	170	100	30	130	10	205	2700	320	365
<u>CANADIAN SHIELD</u>												
SMALL												
CHUB	1415	100	275	10	405	295	700	0	1180	990	250	80
CLAYTON	1260	105	225	50	385	320	705	155	635	1285	155	20
CRADLE	1735	40	250	20	65	400	465	0	1310	255	470	180
DELANO	1500	70	480	10	210	215	425	0	1220	380	325	170
GLEN	1810	210	0	0	235	245	480	0	875	610	380	5
HAMER	1470	0	20	210	590	200	790	0	1520	1095	260	10
HENEY	1290	65	220	85	475	215	690	150	630	2740	270	90
MOUSE	1545	25	240	15	235	430	665	0	1310	735	250	55
PLASTIC	1290	35	395	265	260	245	505	0	1420	840	265	145
RANGER	1640	195	60	0	350	225	575	0	935	725	285	20
RED CHALK EAST	1110	205	940	0	130	45	175	70	1140	940	170	310
SKIDWAY	1330	420	110	630	0	10	10	0	1120	25	215	80
MEDIUM												
BASSHAUNT	1535	70	345	60	170	240	410	70	655	630	405	260
BEAR	1250	175	265	0	185	275	460	0	1315	705	260	150
BLUE CHALK	1755	280	205	15	175	45	220	25	1380	845	325	35
BUCK	1590	55	455	0	270	130	400	0	1250	1300	385	230
CLEAR	1515	240	290	0	245	210	455	0	770	575	285	150
CROSSON	1325	195	495	115	275	15	290	80	920	1875	165	365
DICKIE	1155	280	590	210	265	0	265	0	155	2155	85	490
FAWN	1280	165	55	395	580	15	595	10	245	1605	30	0
HARP	1640	95	415	45	255	50	305	0	475	2105	130	305
MEACH	1655	85	235	0	375	145	520	0	680	680	305	115
MOOT	1355	165	555	120	240	10	250	60	610	840	90	165
PEARCELEY	1180	135	800	220	90	40	130	0	530	720	280	355
PINCHER	1630	40	415	100	50	255	305	0	1490	250	310	335
RED CHALK MAIN	1480	230	390	20	165	105	270	110	905	820	380	210
RIDOUT	1390	190	480	30	345	25	370	40	525	1305	285	310
WESTWARD	1470	150	420	115	145	200	345	0	1385	295	400	155
LARGE												
BIGWIND	1070	150	745	35	265	35	300	200	605	700	215	170
BOSHKUNG	1145	350	500	90	305	110	415	0	705	315	145	265
BRANDY	1340	35	0	510	540	75	615	0	715	1425	180	0
CROWN	1435	130	245	0	345	345	690	0	1020	535	395	35
DICKEY	1470	280	380	125	100	145	245	0	1175	275	400	200
HALLS	1665	205	230	20	310	70	380	0	1045	340	135	130
KAWAGAMA	1185	450	740	30	15	70	85	0	655	1330	300	455
KOSHLONG	1820	225	70	90	240	5	245	55	895	2135	35	115
LEONARD	1410	125	230	510	115	110	225	0	1270	415	255	265
LOUISA	1690	165	215	25	220	65	285	120	440	1505	195	150
SHERBORNE	1310	45	305	150	365	325	690	0	855	445	450	20
SMOKE	1460	230	505	0	155	150	305	0	735	1220	485	335
TIMBERWOLF	1825	45	220	0	215	125	340	70	505	575	410	235
TWELVE MILE	940	255	965	0	335	0	335	0	245	2200	30	200
YOUNG	2085	100	60	0	160	95	255	0	900	410	260	20
<u>KAWARTHAS</u>												
BALSAM	1190	330	360	175	170	70	240	205	185	2065	205	595
BUCKHORN	1045	345	780	110	125	105	230	0	600	790	125	425
CHEMONG	1675	135	565	0	95	30	125	0	460	1070	270	355
SCOGOG	1830	130	180	0	325	35	360	0	105	845	60	130
<u>WETLANDS</u>												
AVERY P2-18	1315	50	10	290	520	315	835	0	525	945	200	5
DAWSON POND P2-5	1635	0	10	60	765	30	795	0	405	1100	350	10
DUCK	750	0	560	150	670	370	1040	0	330	975	415	115
PLOT 2 POND 19	890	0	0	830	730	50	780	0	420	1120	50	0
PLOT 2 POND 9	1300	0	0	0	430	770	1200	0	700	1490	240	0
RED CHALK POND 1	1150	280	0	0	745	315	1060	0	995	1220	350	0
RUSH	1140	0	20	260	970	110	1080	0	185	1300	115	0
SLIM	1175	230	180	0	855	60	915	0	270	1520	110	25





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